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Sand Mixing Plant for a Large Foundry

How Four Different Core Sand Requirements for Five Core Rooms Are Met by the Aluminum Castings Company, Detroit

The Aluminum Castings Company, of Detroit, Mich., has a foundry arranged on the unit plan. There are 5 foundries and 5 core rooms. The core rooms and foundries are separated by a central passage which also serves as a furnace room. The sand mixing plant is located at one end of the series of core rooms.

The old plant was taxed to its capacity and it was decided to rebuild it in such a way as to reduce labor to a minimum. The methods of handling the labor and the general work of production are under the charge of F. A. Parkhurst, organizing engineer. The design of the sand handling machinery and the arrangement of the rooms and the storage was looked after by the H. M. Lane Company, Detroit.

The problem was to deliver to any one of 5 core rooms 4 different types of core sand, and in some cases special sands, without having to interfere with the intermediate departments by trucking through them, and at the same time to insure core mixtures accurately proportioned and of uniform strength. The general arrangement of the equipment finally adopted is shown in Fig. 1. This consists of two 6-ft. batch mixers and a roll blending machine furnished by the Standard Sand & Machine Company and a pan mill furnished by the Wadsworth Core Machine & Equipment Company.

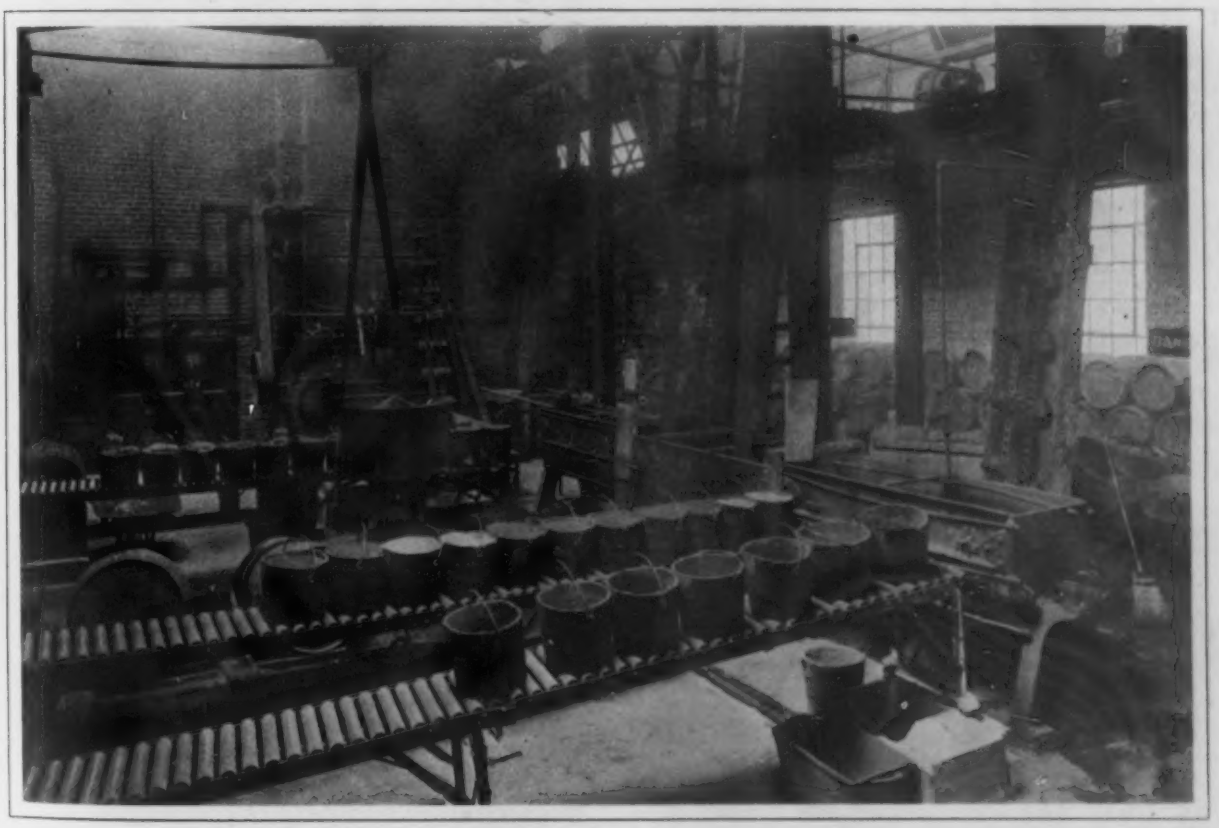


Fig. 1—General View of the Sand Mixing Department

SAND STORAGE

The sand storage consists of a wooden building 175 ft. long with a railroad track at each side of it arranged so that the sand can be shoveled from the cars directly into the sand bins on each side of the building. A portion of one of the walls of this

Fig. 2—Outside of Sand Storage Bins. This Illustration Shows the Side of the Building Through Which the Sand Is Shoveled from the Track into the Bins on the Inside. It Also Shows a Large Sliding Door for Admitting the Cars of Molding Sand or Metal, So That They Can Be Unloaded Inside the Building

building is shown in Fig. 2. The view also shows the large door at the end of the storage track which permits the placing of a car inside the plant for unloading in cold or stormy weather. The molding sand is piled in a bin at the right of the car. This brings it as close to the foundry as possible. The metals are unloaded at the left and taken through to the metal storage room.

Running through the interior of the sand storage building there is a central passage, as shown in Fig. 3. Access is had to the bins through openings closed with planking placed on an incline. This allows the removal of the lower plank and the drawing of the first sand from the bin without interfering with the sand above or without flooding the passage with sand. The bins are designed of sufficient capacity to carry the entire winter's supply of the various grades required. The posts are anchored in concrete at the bottom and are tied together with rods above. There is also a series of timbers between the bins which act as braces and prevent the pressure of the sand from forcing the walls in. The passage is lighted by skylights at intervals throughout its length, and also has a series of electric lights overhead for work at night or on dark days.

The door leading from the sand storage into the mixing room is shown at the left hand in Fig. 4. At first it was planned to measure the sand at the bins, but later it was found better to bring it in in bulk and pile it at the side of the room as shown in Fig. 4.

Fig. 3—Passageway Between the Double Rows of Sand Bins

THE PROPORTIONING OF THE MIXTURES

To insure an accurate proportion between the binder and the sand used everything entering into the core mixture is either measured or weighed. To minimize the distance the man must travel in making up his mixture, a supply of the binders is kept as close to the mixing machinery as possible. Fig. 4 shows the barrels of oil, glutrin, flour, etc., located between the conveyors which take the buckets to the machines. In practice the mix is proportioned in such a way that the total amount of sand involved can be measured in even 16-qt. pails. For this purpose 16-qt. wooden foundry pails are used. These pails are filled from the several varieties of sand used, at the right in Fig. 4, and the proper number of pails for the mixture is placed on the gravity carrier so that they are run by gravity to the mixing machine. For instance, a mix may consist of 5 pails of old sand, 3 pails of Delray sand and 2 pails of Michigan City sand. This total of 10 pails will be started down the conveyor. The man at the head of the conveyor counts the pails in each set and, as the man at the foot glances up the conveyor, he naturally counts them and if there has been any mistake made he reports it to the other man, which gives a check on the mixture.

Fig. 1 shows the arrangement of the conveyors at the mixer end. The man stands between two conveyors with the full buckets coming down at the left and the empty buckets going back at the right. In the illustration the empty buckets have been blocked in place so as to make them remain near the machine. As soon as the batch has been thoroughly mixed the man in charge opens the bottom of the machine so that the material passes directly into the boot of a bucket elevator which removes it as fast as it comes from the machine. As soon as the machine is empty he closes the discharge and dumps in the buckets of sand comprising a mix. He has his binder already measured out and dumps it in next. This is followed by the necessary amount of water. As fast as he empties the buckets he sets them on the conveyor at his right when they return by gravity to the filling end which is shown in Fig. 4. A row of buckets being fed to one of the machines is also very clearly shown in Fig. 5.

The men in charge of the room operate one machine at a time usually. When the bin above a

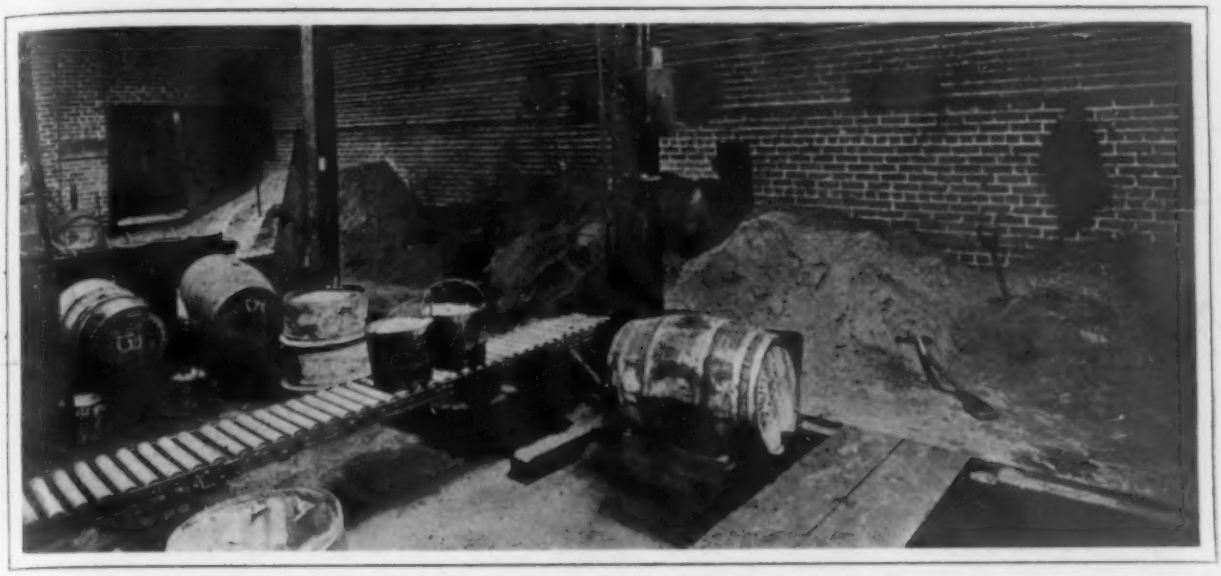


Fig. 4—Sand Platform at the Side of the Mixing Room. The Mixes Are Made by Filling Buckets with the Different Grades of Sand and Sending Them Down the Gravity Carriers to the Machines in Proportion to Form the Desired Mixtures. The Binders Are Kept Between the Carriers Where the Men Can Measure the Amount of Material Required

machine is filled or the desired amount of sand has been introduced into it, they step to the next machine and operate it until the proper amount of sand has been put into that bin.

In the old mixing plant the material was shoveled into the mixer and then shoveled away and it was found that the time necessary to fill the machine and remove the material from it was greater than the mixing operation. When the machine is filled by the bucket method the filling operation is carried out in about half a minute, which doubles the capacity of each machine. In addition to this the accurate measurement of the material gives uniform strength to the cores and makes it possible to work much closer to the limits of strength required in the finished cores.

The binders, which consist of flour, rosin, pitch, glutrin and oil, are stored in a space back of the mixing machines. This space can be seen at the right of Fig. 1 and a portion of it in greater detail in Fig. 6. In Fig. 6 are also seen the rosin and pitch grinders which are used for grinding the raw material. These are located between the rosin supply and the mixing machines and are run by the same men who tend the mixing machinery.

DELIVERY OF MIXED SAND TO CORE ROOMS

As already stated the discharge of each of the machines is into a bucket elevator which carries the sand into storage bins overhead. The elevators are arranged with top take-ups which makes it possible to employ a stationary shaft at the bottom of the elevators. There are four storage bins and ordinarily three of them are used for core mixtures and the fourth one for bedding sand.

Under the spouts of the bins the original sand larry installation was used as shown in Fig. 7. The larry car travels on a track through the roof trusses over the core rooms. It is arranged with a bottom dump and can deliver sand into the storage bins in each of the core rooms. If small batches of special sand are required, they are put through one of the batch mixers and into one of the storage bins until the given batch is made up and put into a storage bin. The larry then draws out the special batch in one or more loads, takes it to the core room where it is required, and drops it into the core room storage bin. The principal mixers, however, that are used in large quantities are generally kept constantly in one of the storage bins. The swinging bin gates for enabling the workmen to draw the sand from the bins to the larry are clearly shown in Fig. 7.

THE DRIVING OF THE MACHINERY

Each machine or group of machines is driven by a separate motor. At the left in Fig. 1 is shown on the wall close to the roll blending machine a group of starting switches all inclosed in suitable boxes. On this can also be seen the motor for driving the roll blending machine which is located above it. At the right on the second floor the motor for driving the two batch mixers is located. This batch mixer motor is also shown at the lower left hand corner of Fig. 7. The Wadsworth mill is driven by a motor located on a bracket supported from a column in the center of Fig. 4.

The elevators are driven from a motor located in the upper part of the structure, but not shown in any of the illustrations. Each individual elevator is driven by a leather belt on a tight or loose pulley from a jackshaft. The belts are controlled by belt shifters operated with chains from the floor of the mixing room.

The installation of this plant has reduced labor charges and has, it is emphasized, improved the quality of the cores greatly by insuring an accurate mixing of the material.

Fig. 5—Batch Mixer and Hopper for Receiving Bulk Sand

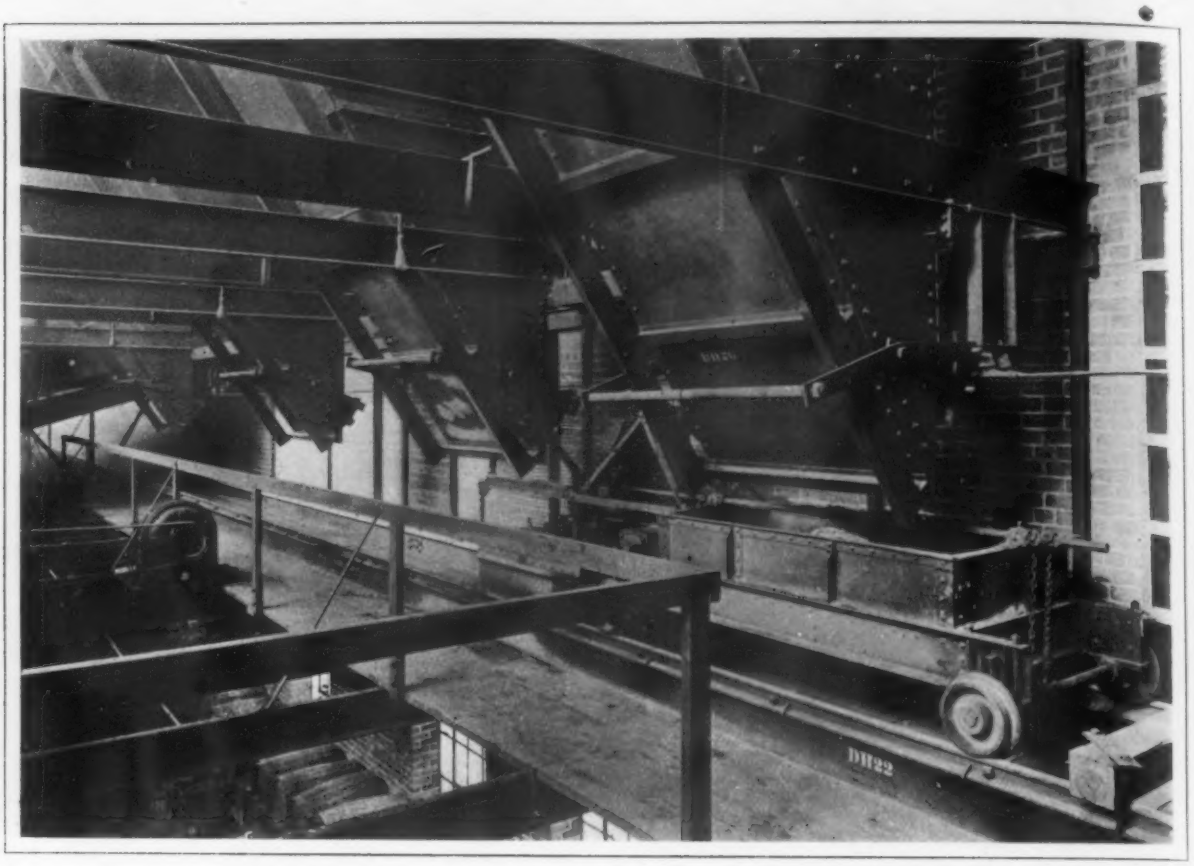


Fig. 7—Sand Larry for Distributing Mixtures to Core Rooms, Foundry of Aluminum Castings Company, Detroit

Conditions in Cleveland Metal Trades

Industrial conditions in metal-working lines in Cleveland, Ohio, are shown by reports just prepared by the Committee on Industrial Development of the local Chamber of Commerce based on 28 replies to inquiries sent to manufacturers of iron and steel, machinery, machine tools, and other iron and steel products. Similar data were secured from manufacturers in other lines, as well as from various wholesale and retail dealers. The figures show considerably heavier losses in business in iron and steel lines than in other manufacturing industries.

Taking October, 1913, and the first 10 months of 1913 as a basis of comparison, the percentage of increase or decrease is shown for the corresponding period this year. The volume of business in iron and steel lines in the 10-month period was only 71.4 per cent. of that in the corresponding period of 1913. In October last, however, it was only 62.2 per cent. of the corresponding month a year ago.

Fig. 6—Rosin Grinders in Storage Room Back of the Mixing Room

The figures show considerable discrepancies between the volume of business and number of employees and hours of work daily. Taking the 10-month period, while the volume of business was 71.4 per cent. as compared with last year, the number of employees was 83.2 per cent. and the number of hours per work daily was 90.5 per cent., as compared with the first 10 months of 1913. With October business only 62.2 per cent. in volume as compared with that a year ago, 77.6 per cent. as many men were employed and the number of hours of work daily was 85.6 per cent.

Reports from makers of automobiles and automobile parts are more favorable. These show that the plants employed 87.1 per cent. as many men as in the first 10 months of 1913, and that in October the number of men employed was increased to 99 per cent. The volume of their business was 94 per cent. for the 10 months and 98.2 per cent. for October.

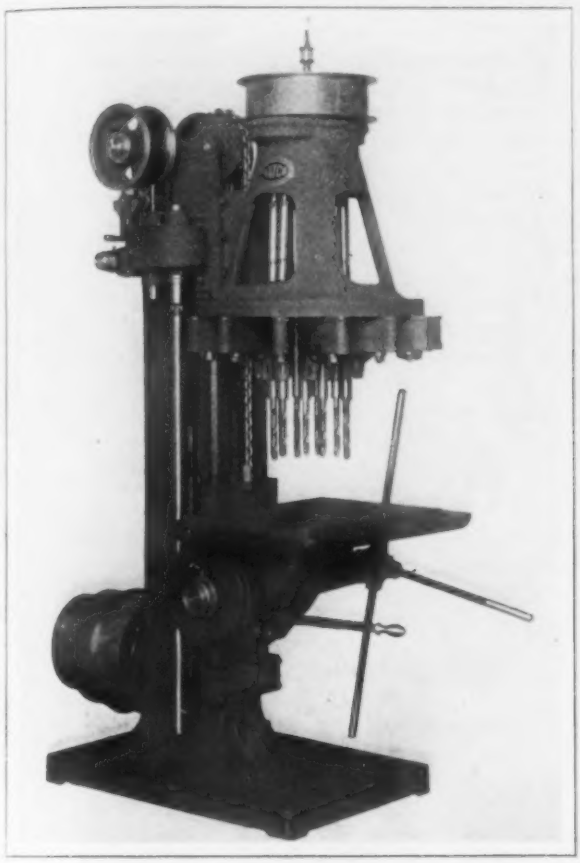
Analyzing the figures relating to iron and steel products, the report states that they show that manufacturers in these lines are carrying their employees along in order to ease, as far as possible, an otherwise much more serious situation, and that it is particularly notable that the number of hours per day or week has been cut in many cases so that employees, while earning less, are still able to maintain themselves.

The committee is of the opinion that the figures taken indicate that conditions as to unemployment are not so serious as was first supposed, although there are indications that unless business in general improves the burden that the employers have taken upon themselves in keeping their plants running in excess of sales and shipments will prove too heavy to be maintained.

Regarding the policy of furnishing part time employment for as many men as possible, the committee has the following to say: "Where it is necessary to curtail operations, the practice of operating the largest force of employees possible at a fewer number of hours per day and week is commendable and should be extended by employers in every possible case. This will mean that, while the aggregate income of employees will be smaller, the income in each individual case will be sufficient to meet present needs."

Heavy Multiple Drilling Machine

A multiple-spindle machine designed for drilling holes up to maximum of ¾ in. in cast iron under heavy feeds has been developed by the National Automatic Tool Company, Richmond, Ind. This machine, which is designated by the builder as its No. 22 size, is designed for use with high-speed drills and will drive from six to eight ¾-in. drills or their equivalent in cast iron. Various sizes of round and rectangular heads that may be equipped from 2 to 16 spindles, capable of adjustment to any layout



A Recently Developed Vertical Multiple-Spindle Machine for Drilling Holes in Cast Iron Under Heavy Feeds

within the range of the heads and also having a vertical adjustment to take care of variations in the length of the drills, are provided.

The column, which is of heavy box section, has a wide face to give a large bearing for the table knee. A coarse pitch steel rack is securely fastened to the face of the column and the hardened steel pinions used for elevating the table mesh with it. Space is provided within the column to take care of the counterweights for balancing the table and a flange is cast around the outer edge of the base to prevent the oil from falling on the floor. The table knee is of box section, reinforced by internal ribbing with an extended top. The table is operated by the adjustable hand lever or pilot on the right or the power feed lever beneath it at the left. An upward motion of the latter lever engages the power feed which is thrown out by pulling the lever down. This feed can also be tripped automatically by an adjustable dog. After the feed is tripped the table returns to a position determined by the spring bumper below the knee, which may be moved up or down, depending upon the hight of the work handled. The use of the automatic drop table, it is pointed out, enables the operator to run two or more machines or to load another set of jigs while one machine is drilling. A channel for catching the overflow of the lubricant is provided and there are T-slots at both ends of the table to enable jigs to be clamped in position.

The head is fastened to the column by a tongue and groove and bolts and the various sizes that can be supplied can be equipped with different combinations of adjustable arms or cluster boxes, a wide flange around the head being relied upon to give a rigid support to the arms. The drill spindles, which are of crucible steel, are hardened and ground and have ball thrust bearings and lock nuts on the upper end to take up wear. They are bored for standard Morse tapers or are furnished with collets for using straight shank drills. The spindle bearings are of phosphor bronze and are fastened to the semi-steel adjustable arm of I-beam section by the builder's patented construction that enables the drill spindles to be adjusted for drills of different lengths easily and quickly. This vertical adjustment is secured by tightening or loosening the hexagon nut on the lower stud, and it is pointed out that this nut is always accessible, regardless of how closely or in what position the spindles may be grouped. In this way it is possible to adjust the drill spindle vertically for different lengths of drills without disturbing the position of the adjusting arm. The universal joints employed are composed of but five parts, each of which is milled from the solid, and all friction surfaces are hardened. The driving pinions on the center block are milled integral with it, no inserted pins or screws being used.

A feed box giving three changes of positive geared feeds is located on the left side near the top of the column and is driven from the idler pulley by a Morse silent chain. The feed changes can be secured while the machine is running and the gears are hardened and run at moderate speeds in an oil bath. Phosphor bronze is used for the feed worm gear, the worm being provided with an extra heavy ball thrust.

Alloy Steel Forging Company to Enlarge

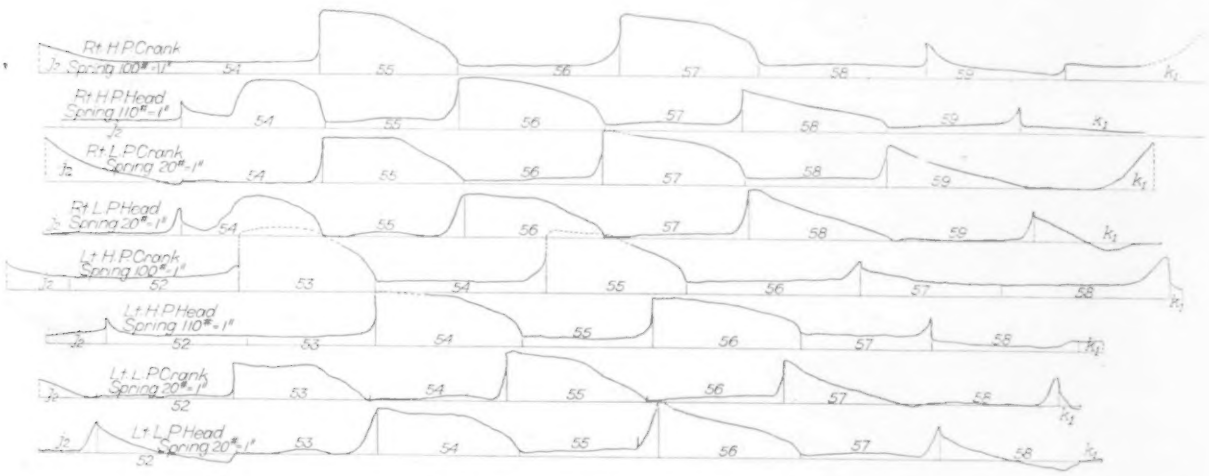
The Alloy Steel Forging Company has for some time been operating in a lean-to adjacent to the works of the Braeburn Steel Company, at Braeburn, Pa., near Pittsburgh. It has been so successful that it has decided to materially enlarge its facilities for the manufacture of manganese steel specialties. It has placed a contract with the Riter-Conley Mfg. Company, Pittsburgh, for a steel building, 100 x 300 ft., at Carnegie, Pa., where a tract of eight acres has been secured, furnishing ample room for probable further extensions. The site is located on the Pittsburgh, Chartiers & Youghiogheny Railroad, and has excellent facilities for receiving and shipping. The new building will contain three bays, each 33 x 300 ft. The two side bays will have hand cranes, while the middle bay will be commanded by a 20-ton electric crane. Most of the new equipment to be installed has been purchased. The company's products include woven manganese steel screens, billet and plate conveyors, draw-bench manganese steel forgings from 75 to 12,000 lb. in weight, forgings for pulverizing machinery, trolley-car pins and wearing plates.

A meeting of Canadian maritime province manufacturers is to be held at Amherst, N. S., to consider the trade opportunities and responsibilities that have been opened up as a result of the war. Stanley B. Elkin, manager of the Maritime Nail Company, and a member of the executive committee of the Maritime Manufacturers' Association, has just returned from Great Britain, after a careful study of industrial conditions there. He found a great demand for the products of his factory and he has brought back excellent orders. Great Britain recognizes the debt that she owes to her overseas dominions, and in the matter of trade supplies she is likely to give them first consideration. Failing to get from Canada the goods she wants, the United States market will be utilized.

BLOOMING-MILL ENGINE TEST

Notable Performance of Tod Reversing Engine at Brier Hill Plant

The blooming mill of the Brier Hill Steel Company, Youngstown, Ohio, whose open-hearth plant and sheet-bar, billet and slab mills were illustrated in *The Iron Age*, April 2, 1914, is a two-high 40-in. mill and is driven by a twin tandem-compound engine having 44-in. high-pressure and 76-in. low-pressure cylinders with a 60-in. stroke. A view of the engine was given in the issue mentioned. It was built by the William Tod Company, Youngstown, in co-operation with Julian Kennedy, consulting engineer for the Brier Hill Steel Company, and is notable for its compact construction. The low-pressure cylinders are set closely side by side with the high-pressure cylinders directly connected to the main frames. The resulting short double-throw main shaft is of interest, in that it is reversible end for end, and has but three bearings. It is emphasized also that with the short shaft the power impulses of the cranks are applied nearer the general center line of the engine than otherwise, reducing the horizontal leverage to which is applied the working action of the reciprocating parts, and reducing the twisting action to the engine as a whole.



The Eight Continuous Indicator Cards Corresponding to Pass No. 11 in Rolling an Ingot to a Bloom

The engine was tested recently. Steam was supplied at 160 lb. pressure and 35 deg. F. superheat. Fifteen passes are used in rolling an 18 x 20-in. ingot to a 7 1/16 x 7¼-in. bloom. The later passes are regarded as a little more difficult to control, perhaps because the piece has become small and does not offer so much resistance per revolution as the earlier passes. Not having space for showing all of the 30 diagrams of the indicator cards and the mean effective pressure curves, pass No. 11 has been selected as a good one for showing the engine control.

Eight continuous indicator cards were taken simultaneously during the rolling of some 20 ingots. The cards for pass No. 11 are here shown and the total mean effective pressure referred to one low-pressure cylinder for the same pass is also given. The total number of revolutions required for rolling the ingot was 47 and the working revolutions were 36.7, leaving for idle and plugging revolutions, 10.3. This is an average of 2/3 revolution per pass more than was necessary for the piece to clear the mill.

The average speed of the engine while rolling is not over 70 r.p.m., due, it is held, to its making so few useless revolutions. The distribution of the work done in per centum of total work has been figured as follows:

Total work, 100 per cent.

Friction work, 13 per cent.

Acceleration or plugging work, 13.6 per cent.

Net work to rolling of steel, 73.4 per cent.

The following information has been obtained from the Tod Company: The ingot on which the Brier Hill test was made was one that had been reheated and consequently was not sufficiently hot at the center. The coefficient for this ingot was, according to the Neeland-Gasche formula, C = 17,300. The actual steam consumption as measured from the high pressure card of the combined card, allowing 25 per cent. condensation factor for working and plugging steam, is 462 lb. per gross ton of steel rolled. The engine is proportioned for condensing, but at present is exhausting to an open-feed water heater. It is quite customary to allow 25 per cent. for the saving of condensing operation, but to be conservative 20 per cent. may be allowed as the net saving. With this condition the engine will roll a gross ton of steel with 371 lb. of steam.

These figures show the results obtained under the operating conditions, but it is interesting to reduce these results to the condition of rolling a thoroughly heated ingot. Ordinary hot ingots on this mill give C = 13,000. The ratio of these numbers (C = 17,300 to C = 13,000) shows the ratio of excess work done by the engine in rolling the colder ingot over to what is ordinarily expended in rolling a hot ingot. This factor, then, is the one to be used in correcting the steam consumption to arrive at hot rolling conditions. Correcting for the temperature effect obtained from the coefficients of the Neeland-Gasche formula, we arrive at the low steam consumption of 350 lb. of steam per gross ton of steel rolled. If we then farther correct for the probable saving due to condensing operation as stated before we find that the engine will roll a gross ton of steel with 280 lb. of steam.

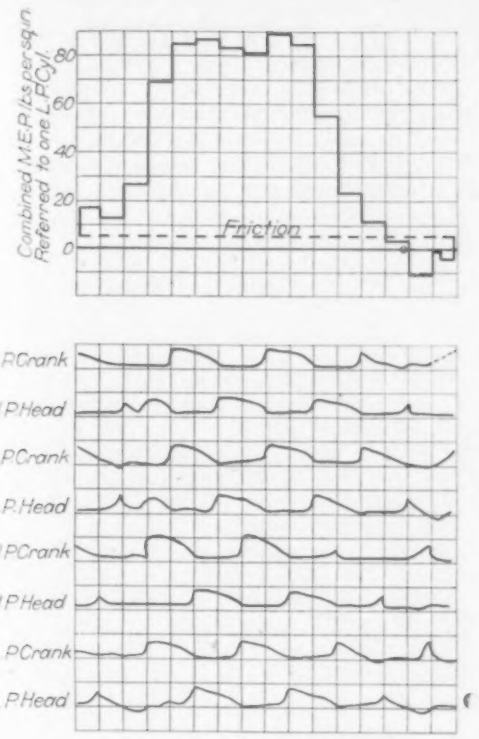
This saving is regarded as due in part to the following items:

1. The steam in the receiver being all shut off is saved.

2. Due to this saving, a corresponding saving is made in the steam used for plugging.

3. The receiver pressure being kept up gives the high-pressure cylinder a higher point from which to begin compression when plugging.

4. The steam retained in the receiver is available for immediate use in starting the engine for



The Total Mean Effective Pressure for Pass No. 11 Referred to One Low-Pressure Cylinder

the following pass, thus helping the engine to start up promptly.

5. The total number of revolutions per pass is kept down, thus diminishing total friction work and at the same time keeping down the high rotative speeds and permitting of rolling a larger number of ingots per hour.

6. The low-pressure cylinder not having steam relieves the plugging due to its own negative work.

The sixth item possibly requires an illustration to make the point clear. In a steam engine as ordinarily run the working steam is acting on one side of the piston and the exhaust steam is acting oppositely on the other side of the piston. But in this engine the throttle valve is closed so promptly that the card produced is a working card below the exhaust line instead of above the exhaust line. The effect of this is to help stop the engine instead of pushing it forward. Numerous negative working cards are produced with an average negative mean effective pressure of 5 or 6 lb. per square inch. Although this is not a large pressure it must be remembered that the low-pressure cylinders are large.

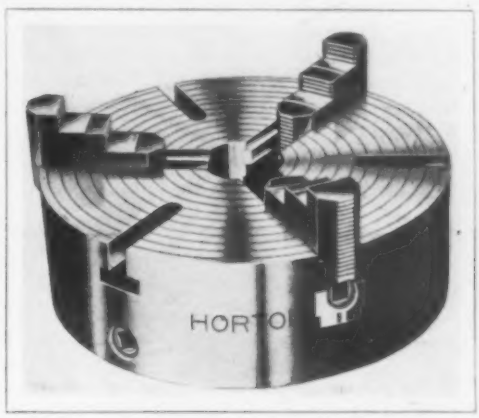
Razors and spoons are being turned out in large quantities in Sheffield, England, for the army. One maker has received an order for 400,000 unplated German silver tablespoons, while five other Sheffield companies are filling another order for 800,000. This is the largest order for these ever awarded. Nearly 100 tons of metal is necessary to produce them. Sheffield has already turned out nearly a million spoons for the army. Its ability to turn out razors fast enough is being seriously taxed and talk of a government razor plant is heard. An army order for a million razors is reported as about to be awarded. At Birmingham, England, manufacturers are very busy on government orders of all kinds. Every lathe and press is said to be sold, with others being produced as fast as possible. It is becoming difficult to secure operators for the machines in use.

The Tucker Tool & Machine Company, 75 Murray street, New York, has been appointed sole distributer for the National Umbrella Frame Company, Thirtieth and Thompson streets, Philadelphia, Pa., manufacturer of lock washers.

A Combination Geared Scroll Chuck

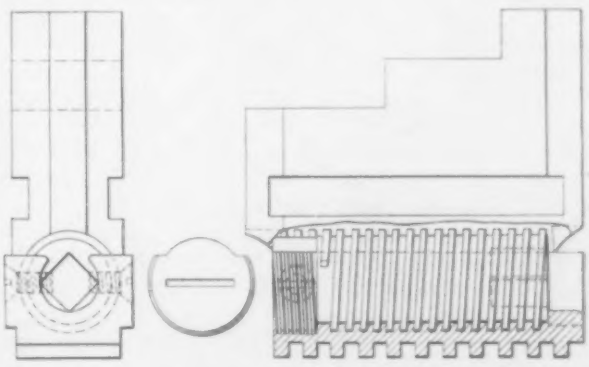
The E. Horton & Son Company, Windsor Locks, Conn., has recently added a combination geared scroll chuck to the line already manufactured. Each of the jaws may be operated independently by a screw or the scroll gearing will operate all of the jaws, either three or four, and it is this feature that gives the chuck its name. Aside from this arrangement, another feature is that a special form of screw carrier has been designed, which is relied upon to prevent the screws dropping out when the jaws are removed to reverse them.

The screws employed for the independent movement of the jaws are somewhat larger than usual and are of the same section throughout their entire length, thus doing away with the necessity for necking down the screw to form a bearing. The screws are self-contained in a steel screw carrier or socket, the outer surface of which is an arc larger than a semi-circle, this arrangement being relied upon to prevent the screw from dropping out when the jaw is run out of the chuck, a plug threaded to the end of the carrier and locked in place by two binding screws being designed to keep the screw in place. The pinion operating the scroll gear has a steel band pressed on its hub, an arrangement which it is pointed out not only takes the end thrust of the pinion, but also adds to its strength. Both the pinion and the independent screw are operated by the same wrench.



One of a New Line of Combination Geared Scroll Chucks in Which the Jaws May Be Operated Either Independently or in Unison

In the design of the chuck, which is built in sizes ranging from 4 to 24 in. in diameter, the body is practically of U section, which, it is pointed out, gives strength and stiffness. The gearing has the bevel teeth cut so that those at the larger end of the gear are reinforced by the strength of the end of the gearing.



End and Front Elevations of One of the Jaws

Standardization in the Factory*

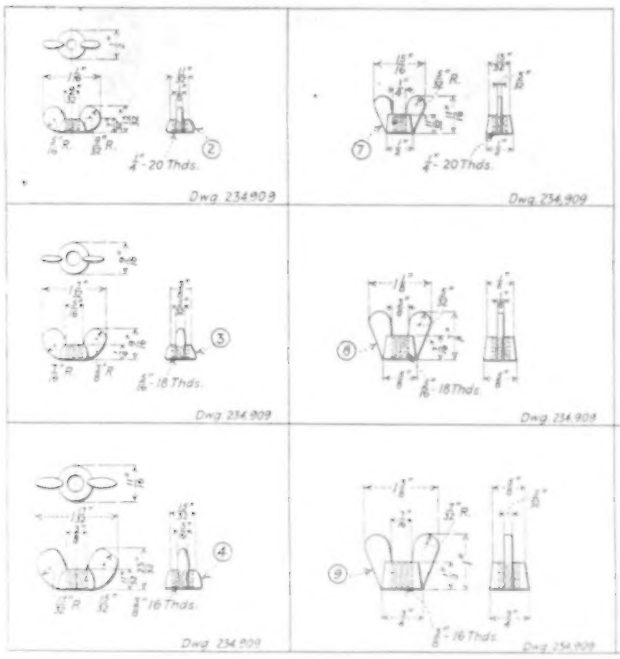
What Has Been Accomplished in a Large Electrical Manufacturing Establishment —Temporary Standards Committees

BY CARL BENNETT AUEL†

The subject of this paper covers so broad a field as to preclude its being handled within the confines of a single discussion, in any but the most fragmentary manner. Accordingly, in what follows, which is a brief outline of a few of the ways and means employed by a large electrical establishment in their work of standardization, no reference will be made to the standardization of the company's products. Rather will attention be directed to a description of certain methods and processes which it is hoped may prove of interest to manufacturers in general, regardless of their particular wares.

In the early days of the company, it was the custom to make all drawings for apparatus as complete and self-contained as possible. Opposite each item a note was placed specifying the material required to manufacture it. When drawings for new apparatus were made and any of the old parts could be used, these parts were shown again on the new drawings in complete detail so that the workmen would not have to refer to any other drawing. Such a system was admirable from the standpoint of the workmen; but, it is obvious that errors could be, and were committed, in transferring old parts to new drawings, and considerable time was required for such reproduction; furthermore, variations occurred in the copying process due either to the ideas of the individual designers or to the fact that they were unable to locate drawings showing the old parts.

The scheme of making elemental drawings, that is, making but one piece on a drawing was next considered; but, while this would insure the greatest accuracy in the duplication of a piece at any time, it has the disadvantage that there are too many drawings to handle, an especially serious matter when the apparatus is at all complicated. A compromise arrangement was therefore adopted, consisting of a natural grouping of pieces or parts on a single drawing. Each piece is assigned an item number and a list of the material involved is located conveniently on the drawing arranged numerically according to item numbers. In the absence of recognized standards, the company arbitrarily fixed upon four sizes of drawings, the smaller being subdivisions of the larger. All blueprints from these are not only made by machine but are further washed, as well as dried by machine, many being also ironed, and are issued to the works unmounted.



WING NUTS

Item	Description and Material	Style No.	Pat. No.	Req.	Ref. Dwg.	Tool No.
2	Wing Nut, Pressed St. H 2194	197938		1		
3	" " " " "	197939		1		
4	" " " " "	197940		1		
5	" " " " "	197941		1		
7	Wing Nut, Alloy No. 4	197943	43868-A	1		
8	" " " "	105939	U-9156-B	1		Pr. Jaws 7495 B1
9	" " " "	197944	43867-B	1		
10	" " " "	197945	43866-B	1		

Portion of a Standard Drawing of a Line of Wing Nuts

A standard drawing of a line of wing nuts, arranged, however, in such manner that the various items may be cut into cards and issued to the workmen who can attach them to the belt-shifters of their machines while working is reproduced. It might be suggested that a simpler form of drawing would consist of one picture only, each part being lettered, a statement immediately below containing the differing dimensions of each size of nut. While this is true, experience shows that with tabulated data of this kind there is a decided tendency for the workmen to misread dimensions, taking perhaps one of them from the line immediately above or below the proper line. As would be expected a very complete reference index is maintained, so that the danger of duplicating items is reduced to a minimum.

Materials used throughout the works are arbitrarily divided into two classes, productive and expense, the former entering directly into the manufacture of the company's products, the latter but indirectly; as examples of each may be mentioned axle steel for armature shafts and leather for ma-

*From a paper presented at the annual meeting of the American Society of Mechanical Engineers, New York City, December 2.

†Director of standard processes and materials, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

chinery belting; occasionally, however, material may belong to both classes. When either the quantity or the importance of the items warrant, specifications are carefully prepared for the purchasing and the inspection departments who use them in the purchase and the subsequent inspection of such materials. As a rule the engineering departments prepare the specifications pertaining to productive items, while the manufacturing departments handle those representing expense items. A typical specification of this kind is that covering cold-drawn steel for automatic screw stock, and it may be mentioned in passing that the general arrangement is in accordance with the standards of the American Society for Testing Materials.

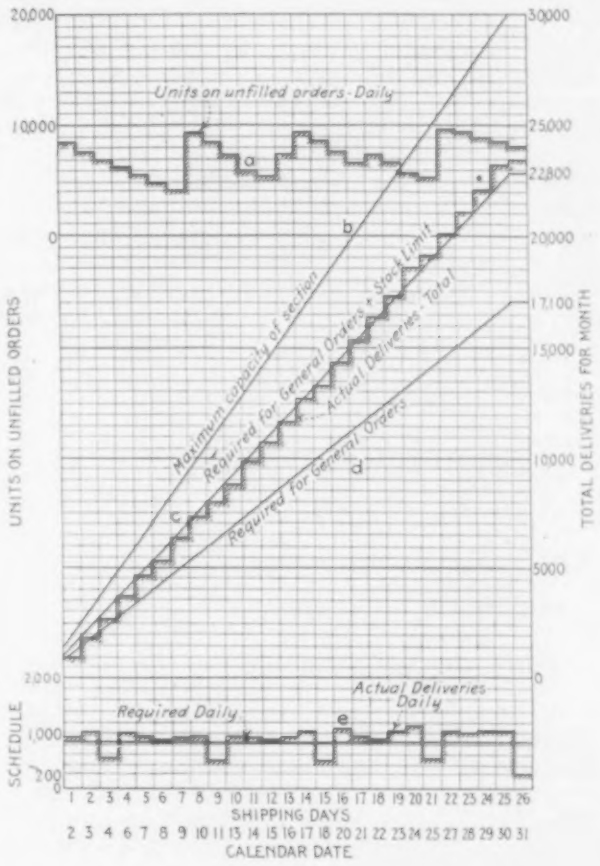
When quotations are received, either on new materials or from manufacturers whose goods have not previously been used, samples are generally required. These are subjected to such tests as may be deemed necessary; and if the results prove satisfactory the manufacturers of the materials are placed on an approved or standard list from which the purchasing department is free to choose when placing orders.

Another equally important line of work consists in the development of manufacturing processes and formulæ which, when standardized, are recorded in permanent form and issued to the various manufacturing departments involved. In this way uniformity in product is assured, there is no needless repetition of lessons or experiences previously learned, and the company is made independent of any individual's knowledge. These specifications and formulæ are revised from time to time as added experience, new equipment or other reasons dictate; and are used by the inspection department in checking the company's products during the course of manufacture.

Every one who has had to do with production has felt the need of a means of portraying in some simple manner the actual output of a department and of comparing it with past as well as with desired performance. To many shop men figures appeal more forcibly than do curves, since they are usually more readily understood; but, it is believed, those shown are so plain as to preclude any objection on such score. Curve *a* is the daily total of unfilled orders, machines or pieces obtained by adding to the total on hand, the number received each day and subtracting the number shipped. Curve *b* shows the maximum possible output of which the department is capable in a month. Curve *c* is the desired output for the same period. While these two latter are both straight lines, their shape could of course be altered, though with a loss in simplicity. Curve *d* indicates the actual output and a comparison between it and curve *c* tells whether the department is working up to its schedule or falling behind. Curve *e* is that of actual daily deliveries. These load diagrams, as they are called, have been standardized and are used quite generally throughout the works, though there are, of course, certain departments where their use would mean but little.

The first steps in standardization naturally fell largely upon the drafting department. As the necessity for further standardization became apparent the work was transferred to the engineering department where the scope was very much broadened, and standard books and card indexes were prepared and placed in every department where needed. As the benefits of standardization were still further appreciated, a standards division of the engineering department and a standards committee were created, whose functions are the standardization of existing materials and parts, but in nowise interfering with or having to do with, the development of apparatus as such.

This committee has but two permanent members, a chairman and a secretary. Subjects which seem



Typical Load Diagram or Visible Production Chart

suitable for standardization either originate with the permanent members of the committee or else are called to their attention by various members of the engineering or manufacturing departments. Sub-committees whose members are drawn from the engineering, manufacturing, purchasing, storekeeping and other departments, are then appointed by the permanent chairman and furnished with instructions and suggestions pertaining to the work to be undertaken. The chairman of these several sub-committees form the temporary members of the main committee, which passes upon all reports presented by the sub-committees. As a report is accepted, the corresponding sub-committee is dissolved, its chairman at the same time ceasing to be a member of the standards committee.

The work of the standards committee has been varied in the extreme, such matters as punched circular washers, thumb and wing nuts, oil-hole covers and hinges, furniture, anchor holes in bearings, wood handles, sizes of tap drills, stresses in eye-bolts, thickness of babbitt in bearings, liners, trucks, etc., having been successfully handled.

Standardizing cutting tools means not alone increased and uniform production from machines of the same class, but it means also that savings are effected in the making of the cutting tools themselves and in the kinds and amounts of raw materials from which they are made. For shaft grinding machines, wheels are now purchased for the largest size and used with them until the diameter is reduced to a certain predetermined figure, when they are returned to the storerooms to be issued in due course, for use with the next smaller size and so on. On milling machines, mandrels and

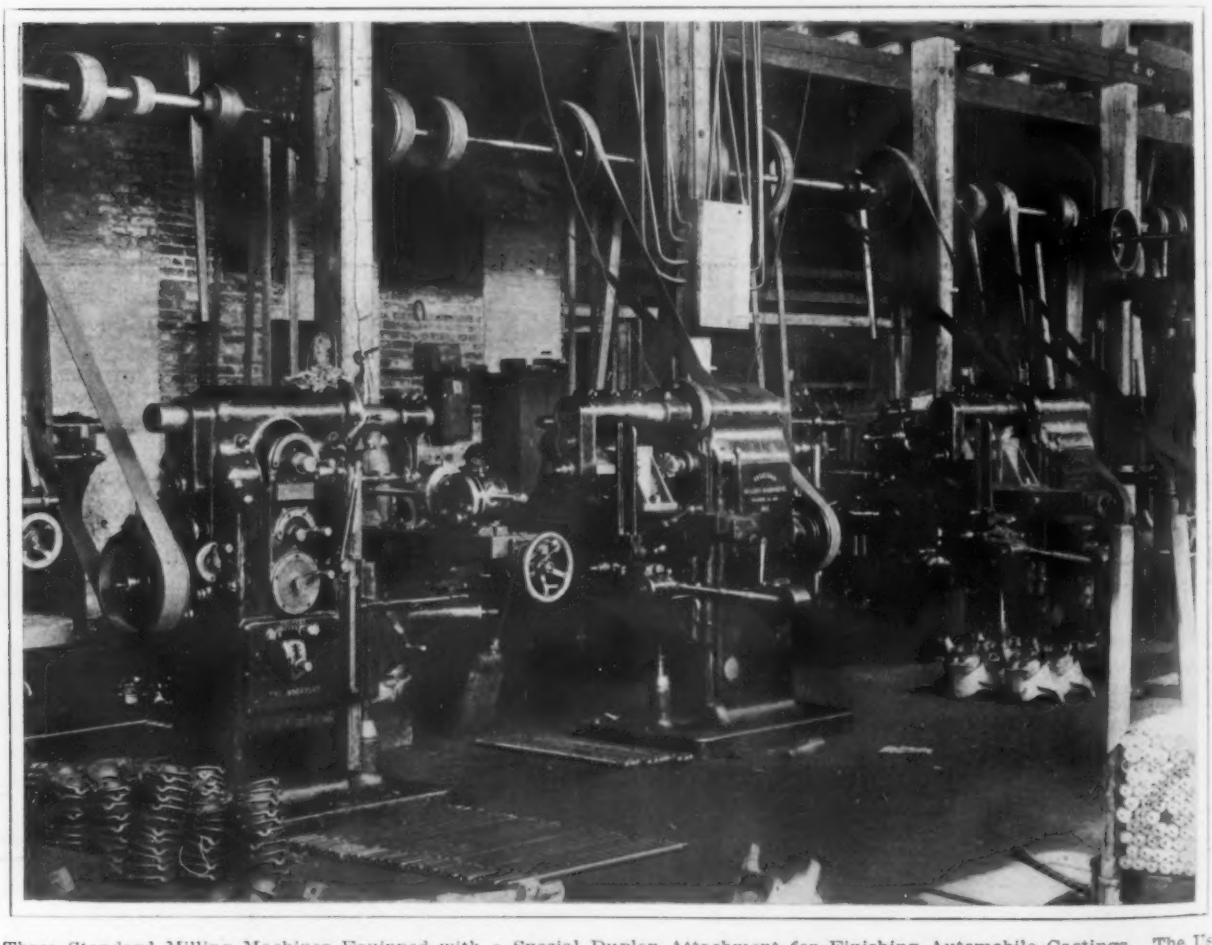
collets have been standardized, and on lathes effort is now being put forth to standardize the spindles with respect to the diameters and the number of threads per inch so that chucks may be used interchangeably.

Considerable attention is being given to the economical handling of the smaller materials; and while the complete solution is still far removed, nevertheless certain gains have been made over previously existing methods. Much of the very small material is packed preparatory to transportation, in misprint cloth bags which can be purchased at very low figures and used many times. These have the advantage over wrapping paper or paper bags in that they do not tear readily when the material is oily. Larger material is placed directly in tote boxes, either with or without wheels; and, while originally of wood these are now being made of metal, those without wheels being telescopic for economical stacking. For transporting, besides the standard gauge steam and narrow gauge electric storage battery cars, three forms of trucks are used, hand, platform-lifting and electric storage. Before installing the electric storage trucks, careful tests were made to determine the possible saving over hand trucks, the result being that a single electric storage truck with a crew of two men was found equivalent to two hand trucks with a total of four to five men. One of the marked indirect gains made by the use of these trucks was in the receiving or unloading department, where the ability to remove material almost as fast as unloaded from incoming freight cars, eliminated from consideration the necessity of providing additional floor space for a department that with only hand truck facilities had become badly congested.

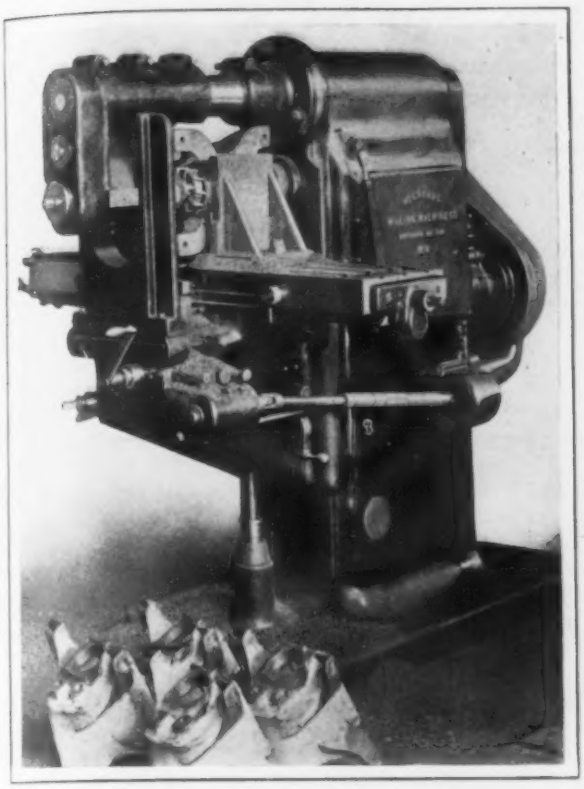
Rapid Finishing of Automobile Castings

Use of a Duplex Attachment on a Standard Milling Machine to Cut Production Time—Output Increased Over 157 Per Cent.

An interesting instance of a reduction in the time required for finishing automobile castings effected through the use of a duplex attachment on the standard type of milling machine is found in the plant of the Mechanics Machine Company, Rockford, Ill. Here a group of three machines built by the Rockford Milling Machine Company is employed on this general class of work. The machine attachment, which is also a product of the Rockford company, and the work in detail and the group of machines are illustrated. The pieces in question required finishing on opposite sides, and as formerly machined necessitated two settings of the piece. The routine followed, before the machines were



Three Standard Milling Machines Equipped with a Special Duplex Attachment for Finishing Automobile Castings. The Use of the Attachment Eliminates One Setting of the Work and Has Increased Production from 60 to 155 Pieces per Day



View of One of the Machines Showing the Duplex Attachment and the Work on Which It Is Used

equipped with attachments, enabled two men to turn out about 60 castings per day. Since the machines have been equipped as shown the same two men have been able to put out about 155 of these transmission cases on the same machines each day.

This duplex attachment is unique in the manner of its use in connection with knee type milling machines, and the method of fastening the attachment to the main column by a heavy flange support, together with the carrying of the drive above and independent of the main spindle, makes possible the use of two slab mills for this job on opposed spindles. The gearing for driving the attachment spindle is arranged in a manner similar to the gearing which is used back of the main spindle for driving the attachment. With a similar flange support and suitable right-angle bearing sleeve the machine may be equipped with a vertical-spindle milling attachment. These attachments are adaptable to any of the builder's milling machines, including the No. 2 heavy all-geared universal type recently brought out by this company.

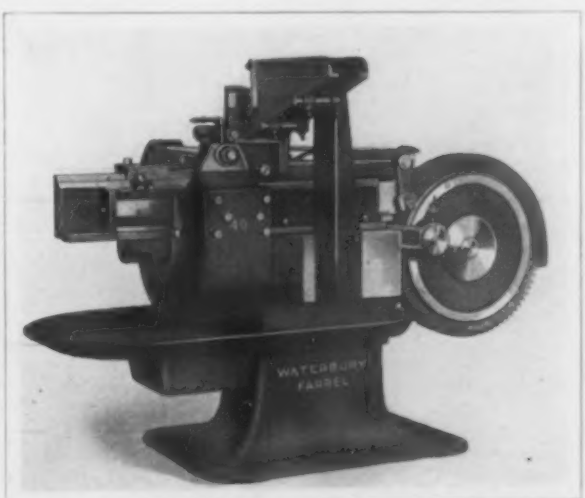
This machine is an exceptionally rigid tool with all its bearings running in high-duty type Hyatt roller bearings. Sixteen spindle speeds are obtainable from but three levers, a starting and stopping lever being placed on either side of the main column. The feed reverse levers are located on either side of the knee, and the machine is also provided with a feed trip lever which will engage or disengage any feed in use. The 16 changes in spindle speeds are in approximately geometrical progression from 15 to 376 r.p.m. The feeds are all automatic and positive, with a range from 9/16 to 20 in. per min. and work measuring up to a maximum of 28 x 8 x 19 in. can be handled. A table is provided with a working surface of 11½ x 50 in. and is operated with a quick return. The machine is designed for a constant-speed drive belted directly to the lineshaft. The driving pulley has a diameter of 14 in. and is intended to run at 390 r.p.m. For motor drive a 5-hp. unit is suitable. The net weight of the machine is 4200 lb.

Reciprocating Thread Rolling Machine

To enable a thread of greater length to be rolled than was possible on its standard screw thread rolling machines, the Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has developed a line of special reciprocating screw thread rolling machines having extra deep dies. Special emphasis is laid upon the fact that in the design of these machines the stiffness and rigidity in the frames of the standard machines have been retained, and other improvements, such as additional strength due to the use of tie rods at the part of the frame where the strain comes while the threads are being rolled, have been added.

Machines of this type are built for both hand and automatic magazine hopper feeding for headless blanks, and the use of these tie rods is relied upon to prevent springing of the frame when threads of considerable length are being rolled and to insure an accurate thread throughout the entire length. When the machine is operated with hand feed, the work is placed in front of a starting slide plate resting on an adjustable depth gauge which is set to give the length of thread required. At the proper time the blanks are pushed forward and gripped by the moving dies and the threads are rolled. The magazine feed is employed for headless blanks that have to be threaded either on one or both ends or the entire length, the threading in the last two cases being done in one operation. This type of feed is especially adapted for threading pieces such as are used in harvester machinery, screws for electrical apparatus, skates and turnbuckles, special bolts, etc., and other work that requires a right hand thread on one end and a left hand one on the other. Where the threads are rolled simultaneously on each end of the blanks, the diameter and the pitch must, of course, be the same, and in cases where a blank portion remains between the threaded portions, the dies are separated with one or a number of fillers to make up the distance that is not to be threaded.

The dies can be used to roll either right or left hand threads, as may be desired. The maximum diameter of work handled by these machines is 1 in.



A Special Reciprocating Screw Thread Rolling Machine with Extra Deep Dies Designed for Rolling a Greater Length of Thread Than Is Possible with the Standard Machine

The machines are built with pump, tank and lubricating system for flooding the dies with lubricant while the work is being threaded.

The Cressman-Kleinman Manufacturers' Company, Drexel Building, Philadelphia, has changed its name to the N. C. Cressman Company.

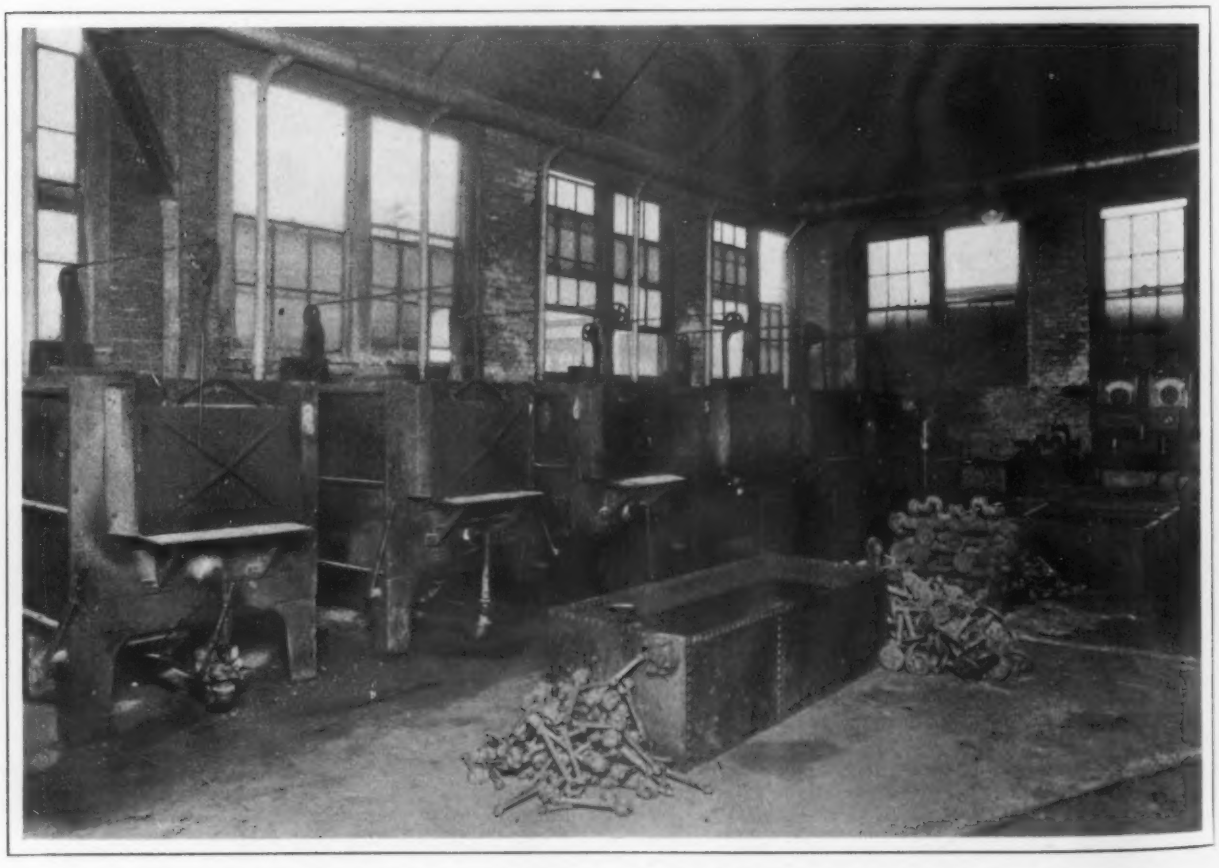
Heat-Treating Plant for Forge Shop Work

New Department of Anderson Forge & Machine Company Designed to Supply Automobile Builders with Heat-Treated Forgings

The heat treatment of their products has been given but little attention by commercial drop-forging plants until quite recently. The automobile industry created an immense demand for forgings, and this industry has been largely responsible for the increased use of alloy steel and gave a great stimulus to the demand for the heat treatment of all kinds of steel, other manufacturers outside of the automobile industry being quick to see the advantages of heat-treated steel. For several years it was the general custom of automobile builders to purchase the various forged parts as they came from the forging hammers and to give these parts such heat treatment as they desired in their own heat-treating plants. Recently, however, proprietors of drop-forging plants have come to realize that there is a good field for them in heat treating, as well as making, forgings, and during the past year or two there has been a growing tendency on the part of buyers of forgings, particularly the automobile builders, to place orders for forgings heat treated according to specifications. The indications are that this call for heat-treated forgings will increase materially and that the commercial drop-forging plant that is not properly equipped for heat-treating work will soon find itself seriously handicapped. It is stated that from 65 to 75 per cent. of all automobile forgings, both in alloy and carbon steels, are given some kind of heat treatment. Buyers in some cases give three or four different heat-treating specifications for a single part. The usual heat-treating operations specified for forgings for automobile parts are to bring the metal to test up to the highest tensile strength, elongation and reduction in area.

A heat-treating plant that is of particular interest because it is designed particularly for the heat treatment of automobile forgings has been recently installed by the Anderson Forge & Machine Company, Detroit, Mich. This company erected a new plant three years ago, but its heat-treating department at that time was not given a great deal of consideration, and the facilities installed were entirely inadequate to supply present needs. The new plant was provided to meet the special requirements for heat treating drop-forged work, and is equipped so that forgings can be supplied heat treated according to any specifications of the purchaser.

The heat-treating department occupies a brick building, 60 x 60 ft., with sufficient window space to make the room well lighted. A large monitor extension affords ventilation through the roof. The floor is partly brick and partly concrete. The furnace equipment consists of 13 heat-treating furnaces, 11 new furnaces having been installed. Along one side of the room is a battery of seven single opening oil-burning furnaces of the semi-muffle type with heating chambers 32 in. wide, 60 in. deep and with a 17-in. arch, these furnaces being used almost entirely for heat treating and annealing alloy steels, and particularly for treating gear work and connecting rods. These furnaces were built by the Bellevue Furnace Company, Detroit. Three



General View of a Battery of Bellevue Furnaces for Heat Treating Alloy Steel Forgings for Automobiles

Three Large Furnaces for Heat Treating and Annealing Large Forgings for Automobiles

large oil-burning furnaces are used for heat treating and annealing large automobile parts, such as crankshafts, axles and camshafts, and for annealing gear forgings. These have heating chambers 8 ft. wide, 8 ft. deep and 30 in. high from the floor of the furnace to the arch. There are also two oil furnaces for temper drawing, a Frankfort furnace for heat treating high-speed steel and a lead hardening furnace.

All the heat-treating furnaces are connected with a Hoskins water-jacketed indicating pyrometer furnished by the Hoskins Mfg. Company, Detroit, Mich., a water jacket for the connection at the back of each furnace being provided to secure more accurate readings than would be possible were the instrument affected by the changing temperature in the room. The cold end junction on the pyrometer at the back of each furnace is protected by a water jacket connected with coils, through which water is kept in circulation. The three large furnaces have a double pyrometer connection, one at the front and the other at the back of the inside of the firebox. After the steel is heat treated its hardness is determined by a scleroscope, and another instrument, a pyroscope, is used for taking temperature, this being a check on the readings of the pyrometer. The two former instruments were furnished by the Shore Instrument & Mfg. Company.

For quenching there are three large water tanks of sheet steel and concrete, located convenient to the furnaces. One of these is 96 in. long, 34 in. wide and 60 in. deep; one 72 in. long, 24 in. wide and 54 in. deep, and the third is 48 in. x 48 in. and 48 in. deep. Water is supplied to each of these tanks by a 2½-in. pipe connected with the company's water pumping system. These tanks are used for quenching simple carbon steel forgings, such as crankshafts, connecting rods, camshafts, etc. For treating alloy steel there is a large oil cooling tank 7 ft. long, 6 ft. wide and 56 in. deep. This tank is connected with an oil cooling tank outside the building, placed underground, the oil being cooled by circulating it through coils of 1½-in. pipe. The length of this pipe in the cooling tank, together with the pipes leading to and from the quenching tank, is 1500 ft. The oil is discharged in the center of the bottom of the quenching tank. It is kept in circulation by a Blackman motor-driven rotary pump, which forces it through the coils into the quenching tank, from which it flows by gravity back to an overflow, from which it is pumped through the coils and back again to the quenching tank. The water in the outside of cooling tank is supplied through a 2-in. inlet, and overflows from a 3-in. outlet into the sewer.

Fuel oil used for the heat-treating furnaces and the furnaces in the forge shop is stored in two 20,000-gal. storage tanks. One Blackman direct-connected motor-driven pump is used for pumping the supply to the heat-treating furnaces, but in case of a breakdown one of the two forge shop pumps

The Pickling Tanks and One of the Trucks Used for Handling Forgings

can be used for this purpose. Air is supplied to the heat-treating department at a 9-oz. pressure by a 16-in. American Blower Company's motor-driven direct-connected blower. Arrangement is made so that the various power units may be driven by the company's own power or by current furnished by a commercial power line.

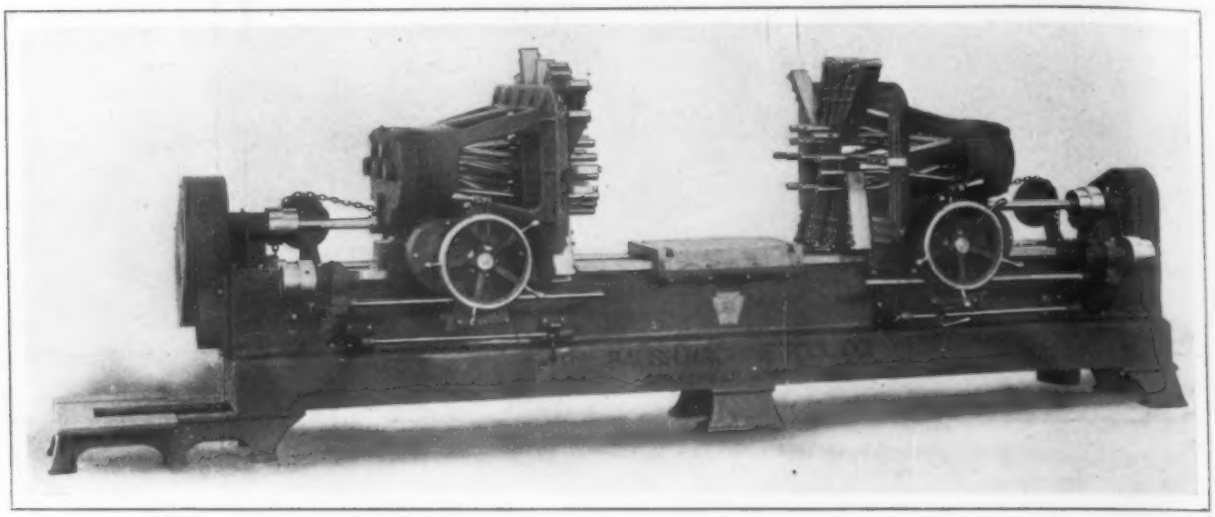
Adjoining the heat-treating building is a pickling shed, 16 x 60 ft., in which are four large pickling tanks 5 ft. long, 39 in. wide and 30 in. deep. These tanks are set in a concrete gutter so that the pickling solution can be drained off and used over again. All work after being heat treated and quenched is put into the pickling tanks, being immersed in the pickling solution in copper baskets that are handled with a trolley hoist. An industrial track is provided for the convenient handling of material around the heat-treating department, one of the special cars which are arranged for the shoveling of parts from one side being shown. The capacity of the plant is indicated by the fact that over 30,000 lb. of forgings have been heat treated in it in one day.

A 300-Hp. Gas Engine Switching Locomotive

The McKeen Motor Car Company, Omaha, Neb., recently built a 300-hp. switching locomotive equipped with a gasoline engine, which will exert a tractive effort of 12,000 lb. at a speed of 6 miles per hr., with power developed by a six-cylinder engine. There are two pairs of driving wheels and at the ends of the front or main driving axles and the rear driving axle are counterbalanced crank disks which are connected by side rods. The power transmission, which is pneumatically operated, employs a sprocket on the crankshaft, the chain passing through a sleeve working free on the rear driving axle. The power is then transferred through a multiple-disk friction clutch which delivers it through a chain to the forward driving axle where a series of gears are employed to produce heavy tractive effort and high torque for starting purposes or the power is delivered directly to the driving wheels. One of the special features of the engine is the use of two exhaust pipes extending through the roof. The cab, which is constructed entirely of steel, is placed in the center, and it is pointed out that the engineer has an uninterrupted view in all directions. The locomotive made the trip from Omaha under its own power to Matador, Texas, where it will be used in freight and switching service between that point and Roaring Springs Junction on the Quanah, Acme & Pacific Railway.

Universal Horizontal Drilling Machine

A horizontal drilling machine with universal adjustment was recently supplied to the Pittsburgh Model Engine Company, Pittsburgh, Pa., by the Baush Machine Tool Company, Springfield, Mass. This machine is universally adjustable and is designed for drilling to very close centers, as well as irregular layouts. There are two heads which enable both sides of a piece of work to be drilled simultaneously.



A Horizontal Multiple-Spindle Drilling Machine Having a Universal Adjustment for All of the 37 Spindles to Care for Irregular and Close Center Layouts

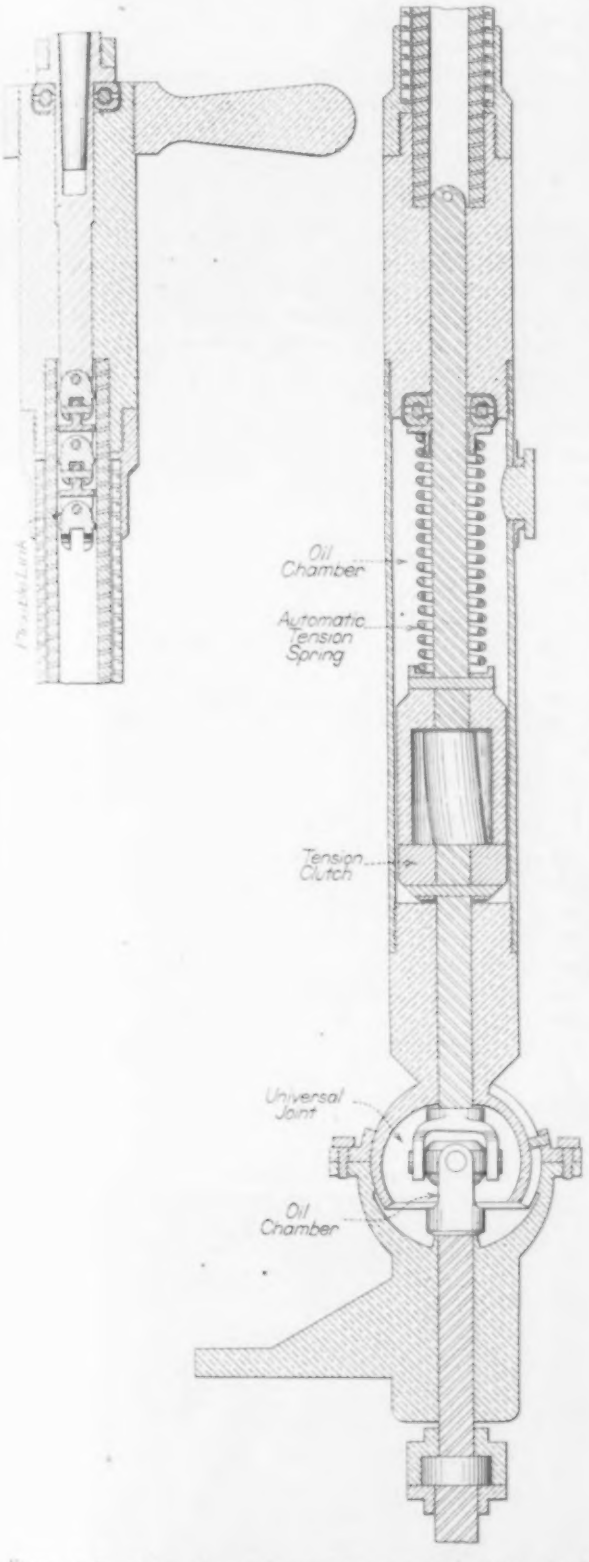
The machine has a capacity for 48 spindles divided equally between the two heads, although the machine illustrated is equipped with only 37, 15 in the right head and 22 in the left. Each of the heads has independent feed and an automatic feed stop, and the entire machine is arranged for motor drive. The arms supporting the spindles are of a new design which, it is emphasized, enables considerable vertical adjustment to be obtained without the disadvantage of having any bolts or screw heads project around the spindle bearing. This is of advantage where work requiring a number of holes to be drilled to close centers or an irregular layout is to be handled and is secured by the use of a steel strapped arm with an adjustment on the extreme outer end. The maximum size of work that can be handled by this machine measures 16 x 30 in.

Regulations for the allowance of drawback of duty paid on imported brass condenser tube heads, used in the manufacture of steam boilers intended for export, have been prepared by the Treasury Department as an amendment to the general regulations permitting the use of various imported materials and attachments in the production of boilers for the export trade. The allowance shall not exceed, for each condenser exported, two imported brass condenser tube heads of the dimensions, weight, and value of those used in the manufacture thereof, as shown by the sworn abstract from the manufacturing record, the allowance to be reduced according to the waste.

The Johnson Line of Sweden, which will begin a motorship service between Stockholm and San Francisco this month via the canal, has established westbound rates on the principal commodities that it will carry. The rates received by W. R. Grace & Co., coast agents for the line, are as follows, per 1000 kilos (2204 lb.); Swedish bar iron, 25s. ($6.09); hollow drill steel, 25s. ($6.09); surgical instruments, 90s. ($21.90); cement, 27s. 6d. ($6.69).

An Improved Form of Flexible Shaft

The United Mfg. Company, 1015 Commerce Trust Building, Kansas City, Mo., has placed on the market a new type of flexible shaft. It has a flexible metallic oilproof casing to furnish an outer covering for the shaft and allow it to run submerged in oil, an oilproof universal joint at the driving end of the shaft, an automatic tension and a special arrangement of steel and drawn bronze links. In the accompanying drawing these features, with the exception of the casing, are shown.



Views of Portions of a Recently Developed Flexible Shaft Showing the Automatic Tension, Oil Proof Universal Joint at the Driving End and the Construction of the Links

The use of an oilproof universal joint at the driving end of the shaft, it is emphasized, enables the shaft to be moved without bending over quite a wide arc, and in conjunction with the flexibility possessed by the shaft itself, enables tools to be used in practically any desired position. The links of the shaft are made of steel and drawn bronze. The automatic tension used is relied upon to keep the shaft links taut, thus causing them to rotate on the hub bearings of the links when the shaft is subjected to a sharp bend. When the flexible shaft is bent the length of the bearing spring and the outer casing is increased and the use of the coupling and tension spring permits the shaft proper to increase its length in proportion to that of the bearing spring and outer casing. When the coupling extends to increase the length of the shaft oil is forced out of the oil chamber to lubricate the links.

The tool end of the shaft has a handle for the convenience of the operator, and a 4-in. bronze bearing which is relied upon to eliminate end play of the tool. This end of the shaft is also fitted with a No. 2 Morse taper bit socket and the tools are removed by loosening the nut at the extreme end of the shaft.

The shaft, which is made in three lengths of 5, 8 and 10 ft., with links $\frac{5}{8}$ in. in diameter, is designed for attachment to a work bench for a belt drive, or can be attached to a stationary emery wheel stand or gasoline engine.

A Self-Adjusting Wrench of Wide Range

A wrench that possesses a self-adjustment that adapts it for use with a wide range of sizes of nuts or similar objects has been brought out by A. C. Allan, 420 West Sixty-third street, Chicago, Ill. It consists of four parts, the two jaws, the pin connecting them and the handle. The last named is reversible so that the wrench can be used in confined quarters, and as the jaws can be equipped with teeth, the wrench can also be used for pipe. In use it is simply necessary to place the jaws of the wrench over the nut or other object to be gripped and pull the handle. The adjustment for the different sizes of nuts is provided by the peculiar curved slot in one of the jaws and a slot in the handle. It is pointed out that pulling on the handle merely increases the grip on the nut and that the corners will not be rounded as the wrench takes a firm grip. An instantaneous release is secured by simply pushing the handle in the opposite direction.

A Wrench Having a Self-Adjustment Feature to Adapt it for Handling a Wide Range of Nut Sizes

Australia furnished last week from $20,000 to $25,000 worth of business to manufacturers at Milwaukee, Wis. The Affiliated Manufacturers Company received an order through Richardson, Orr & Co., its New York representative, for about $11,000 worth of gas engines, and the Milwaukee Concrete Mixer Company for concrete mixers valued at between $10,000 and $12,000. A. W. O'Mara, Australian representative of the latter company, visited Milwaukee in person to place the order and to make purchases of considerable other equipment and material on Australian account.

Surface Decarbonization of Tool Steel*

Causes of the Relatively Soft Outside, Which Must Be Removed—The Occasional Hard Ring Within Also a Problem

BY J. V. EMMONS†

It has long been known that the outside skin of tool steel frequently exhibits properties widely different from the interior of the mass. Within the last few years it has been generally recognized that many of these properties were due to surface decarbonization. The origin and effects of this altering of the composition have been but little studied.

A ½-in. round bar of crucible steel having the following composition was selected: C, 1.15; Mn, 0.31; P, 0.022; Si, 0.16; and S, 0.018 per cent.

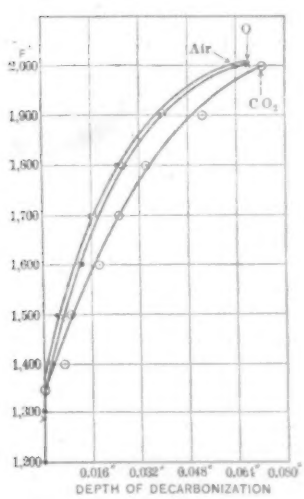


Fig. 1—Decarbonization of Steel Annealed in Air, Oxygen and Carbon Dioxide

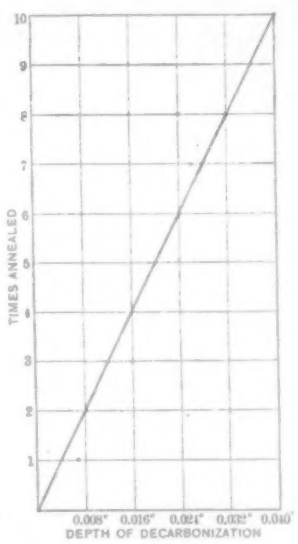


Fig. 2—Effect of Repeated Annealing on Decarbonization of Steel

A microscopic examination having revealed a slight decarbonization already present, the bar was turned down to ⅜-in. diameter to remove all traces of decarbonization. The bar was in the annealed condition, the structure consisting of finely divided lamellar pearlite, with many small grains of globular cementite. It was cut into test pieces about 2 in. in length. The heating operations were all conducted in an electric resistance furnace of the tube type. The temperatures were regulated by means of a Le Chatelier thermo-couple.

EFFECT OF HYDROGEN

A test piece was placed in the furnace cold and gradually raised to a temperature of 1800 deg. F. in a current of carefully purified and dried hydrogen. After holding at this temperature for 3 hr. the current was shut off and the piece was allowed to cool slowly in the furnace. On removal from the furnace, the test piece had a dull-gray crystalline appearance. Microscopic examination revealed no sign of decarbonization. A second test piece was placed in the furnace in the same manner as before, held at 2130 deg. F. for 6 hr., and then allowed to cool slowly in the furnace. This piece exhibited the gray crystalline surface in a still more marked degree. A microscopic examination revealed a coarse network of cementite extending to the extreme edge of the cross-section, giving conclusive evidence that no decarbonization had taken place. This proves that hydrogen is not a factor in the elimination of carbon from steel.

EFFECT OF CARBON DIOXIDE

Pieces from the bar were annealed in a strong current of pure, dry CO_2, at various temperatures. The furnace was brought to the required temperature, the pieces placed in it, held for 3 hr., and allowed to cool slowly in the furnace. Microscopic examination was then made of the cross-section, and the depth of decarbonization measured by means of a micrometer eye piece. For greater ease and accuracy, the decarbonization was measured only from the surface to the point of supersaturation, or to the point where free cementite first made its appearance. This point is much more easily determined than the point where the interior is first affected by the elimination of carbon.

The results indicate that CO_2 gives up to the carbon very readily one of its atoms of oxygen. When the results are plotted in the form of a curve, Fig. 1, with the depth of decarbonization as abscissæ and the temperature as ordinates, it is also observed that the decarbonization increases at a definite rate as the temperature is increased.

EFFECT OF AIR AND OXYGEN

A similar experiment was then performed by annealing the test pieces for 3 hr. in a tube containing air and to which air had slight access through a small opening in one end. The results are very similar to those obtained in an atmosphere of CO_2, with the exception that the rate of decarbonization is now slightly less at all temperatures. The curve plotted from these results is also shown in Fig. 1. A similar experiment was also performed by annealing the pieces for 3 hr. in a current of pure, dry oxygen. The results are very

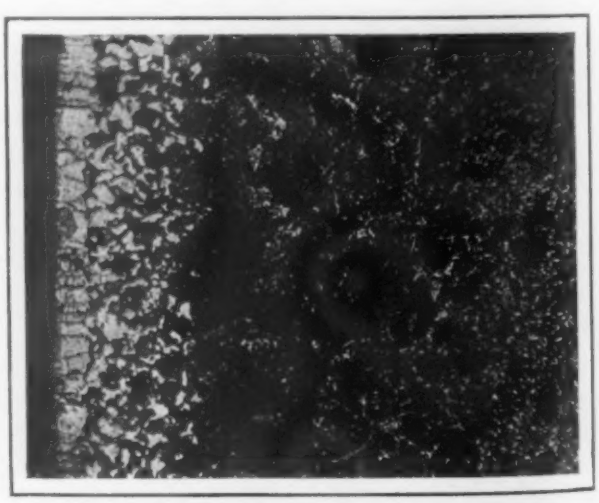


Fig. 3—Photomicrograph, 100 Dia., of the Structure of the Outside of a Bar of Tool Steel That Has Been Decarbonized Showing the Soft Outer Portion, the Hard Ring and the Soft Interior

*From a paper presented at the Pittsburgh meeting of the American Institute of Mining Engineers, October 8 to 10, 1914.

†Chief chemist, Cleveland Twist Drill Company, Cleveland, Ohio.

similar to those obtained in air and CO_2. The curve for these is also shown in Fig. 1.

EFFECT OF CARBON MONOXIDE

A test piece was then annealed for 3 hr. at 2000 deg. F. in a current of pure dry carbon monoxide. Microscopic examination revealed no trace of decarbonization. The CO used was first freed from oxygen and CO_2 by passing through a tube filled with highly heated carbon, and then through several wash bottles containing caustic potash solution. A flask of lime water was placed in the train at both the entrance and the exit of the furnace, to detect any traces of CO_2 either entering or escaping.

A second test piece was then annealed in the same manner, except that a clay boat filled with hammer scale (Fe_3O_4) was placed in the furnace in such a position that the current of carbon monoxide would pass over it before reaching the steel. As soon as the furnace reached its temperature it was observed that a larger quantity of gas was escaping from the furnace than was entering it. This would indicate that the Fe_3O_4 was probably giving up part of its oxygen. This evolution of gas continued through the entire period of annealing. The gases escaping from the furnace were found to contain considerable quantities of CO_2. Microscopic examination of the annealed specimen revealed that the decarbonization had penetrated to a depth of 0.096 in.

To test the effect of water upon decarbonization,

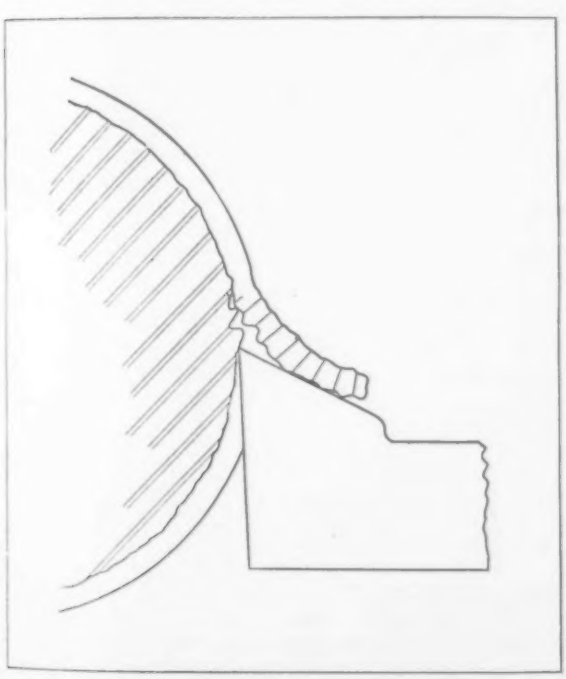


Fig. 4—Diagram Illustrating Action of Metal-Cutting Tools

a test piece was annealed at 1700 deg. F. in a current of steam, the water from which the steam was derived being first freed from CO_2 and air by prolonged boiling. Examination of the annealed specimen revealed a decarbonization to a depth of 0.030 in.

EFFECT OF REPEATED ANNEALING

To test the effect of repeated annealings, a test piece was first packed in a tube with a small amount of charcoal, air being given limited access. It was then repeatedly annealed for 10 hr. each time, at a temperature of 1450 deg. F. The decarbonization was measured after each annealing. The action was due to the CO_2 formed by the charcoal and the

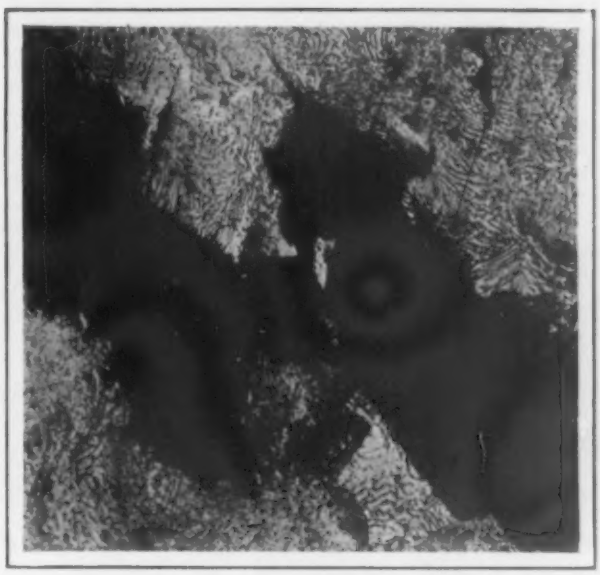


Fig. 5—Photomicrograph, 500 Dia., of a Crack Passing Through the Coarsely Crystalline Pearlite

oxygen of the air. The curve, Fig. 2, plotted from these results shows that the rate of increase in depth of decarbonization with repeated annealings is a constant.

In order to determine if it is necessary for the oxygen to be in the form of gas to combine with the carbon in the steel, the following experiment was performed: A crucible of lead was saturated with lead oxide by the addition of litharge. A test piece was annealed in it for 3 hr. at 1500 deg. F. Microscopic examination revealed decarbonization at a depth of 0.024 in. This shows that easily reducible oxides such as Pb_2O, when dissolved in a molten bath, may also effect the elimination of carbon.

CONCLUSIONS FROM THE EXPERIMENTS

The conclusions to be drawn from these experiments are several:

It is shown that carbon is removed from the steel by a process of oxidation.

The oxidation is effected by either gases or liquids.

The principal active agents of the gases are air, CO_2, and water.

Of the liquids any good oxidizing agent dissolved in a liquid bath may be the active agent.

During the annealing the CO_2 necessary for the elimination of carbon may be formed through the reduction of iron oxide by CO.

No case has been observed where carbon was eliminated while the steel was heated below its critical point. This indicates that it is necessary for the carbon to be dissolved in the iron before decarbonization can take place.

It has been shown that the rate of decarbonization under uniform conditions is constant, without regard to the depth to which it has proceeded. From this we may infer that the carbon is transferred from the interior to the surface by diffusion through the solid solution. The oxidation takes place only at the surface.*

PRACTICAL APPLICATIONS

With but few exceptions, all tool steel furnished by the makers shows decarbonization to a greater or less degree. This is the result of various heating processes during manufacture. The decarbonized surface, or "bark," as it is commonly called, must be removed before the steel is used for cut-

ting tools, wearing surfaces, etc. The depth of bark may vary greatly owing to oxidizing conditions during the hammering, rolling and annealing of the rough material.

In turning twist-drill blanks from the round bar, it is sometimes observed that the outside of the bar, to a depth of several thousandths of an inch, is very soft. Beneath this is a ring about 1/32 in. in thickness, so hard that it cuts a nick in the lathe tool. Below this ring the piece is uniformly soft.

Microscopic examination reveals that the extreme outside of the bar consists of either ferrite or ferrite mixed with pearlite, which would of course machine as easily as machinery steel. The hard ring is found to consist of nearly pure pearlite in very coarse crystalline grains. The soft interior consists usually of finely divided pearlite and globular cementite, which also machines with great ease. Such a bark is shown in Fig. 3.

In case a piece of tool steel is being machined in such a way that only a part of this layer of coarse pearlite is removed still greater difficulty is encountered. The surface of the work will be rough and the point of the tool will be worn out with great rapidity. The rapid wearing of the tool makes it impossible to hold a uniform size on any number of pieces of work.

It has been shown by several investigators that a tool when removing a chip from a piece of metal splits it off by an action similar to a wedge. In this case the hardest wear on the tool occurs not at the extreme point but a short distance back from the point where the pressure of the chip is greatest. Fig. 4 shows this condition on an exaggerated scale. It will readily be seen that there is always a crack running ahead of the tool as it is forced through the material that is being cut. When the tool is cutting in coarse pearlite the crack will naturally follow the lines of least resistance. These are the boundary lines of the grains and through the grain in the direction of the laminations. This being the case, it follows that the larger the size of the crystalline grains and the more distinct the lamellar structure, the more irregular will be the crack and the rougher the resulting surface. Such a crack passing through a mass of coarsely crystalline pearlite is shown in Fig. 5.

EFFECT OF LEAVING THE BARK

If a piece of tool steel upon which a bark yet remains is hardened it is apparent that the surface will be hardened only in proportion to the carbon it contains. This may vary down to the point where the surface does not contain enough carbon to harden at all. In the great majority of cases where tool steel is used for bearings, dies and cutting tools, the most severe wear must be borne by the surface or extreme edge. For instance, in the case of twist drills, a bark remaining on the tool would cause the outside point of the cutting edge, where the speed and wear are greatest, to be soft. This would result in the rapid wearing of the outside corner, causing the drill to run undersize and so increase the friction as soon to destroy the whole point of the drill. The effect of lowering the carbon content of the surface of a die or bearing even 10 or 20 points is very apparent.

Bark is also a frequent cause of checks and firecracks in hardened tools. In this case, when the tool is quenched, a crack is liable to start and run along the boundary between the bark and the interior. A second case in which bark left on a tool may start firecracks is where a coarse network of cementite is present. This cementite network is very liable to start a check or firecrack which will ruin the tool. The manner in which a cementite network starts hardening cracks has been more fully discussed in a previous paper by the author in *The Iron Age*, February 22, 1912.

Combinations to Extend Foreign Trade

WASHINGTON, D. C., December 1, 1914.—The practicability of securing the enactment at the coming short session of Congress, which convenes next Monday, of an amendment to the anti-trust laws permitting American manufacturers and dealers to organize combinations designed solely to extend our foreign trade is the subject of many inquiries, apropos of the hearings now being conducted in New York by the special committee of the Chamber of Commerce of the United States, appointed to frame recommendations for legislation to the end referred to. Deep interest in this important problem has been aroused here among administration officials, Senators and Representatives, and the progress of the campaign will no doubt be followed with close attention by producers and exporters in all lines.

Realizing that the coming session of Congress will consist of but 60 legislative days, within which all the big supply bills involving a round billion dollars, must be enacted, the promoters of this movement appreciate that it must be given a tremendous impetus if the desired legislation is to be obtained at this session. The proposition is not new and the movement may be said to have been set on foot when Congress passed the act creating the Federal Trade Commission, in which a provision was incorporated authorizing the commission "to investigate, from time to time, trade conditions in and with foreign countries where associations, combinations, or practices of manufacturers, merchants, or traders, or other conditions, may affect the foreign trade of the United States, and to report to Congress thereon, with such recommendations as it deems advisable." This provision was added after the interstate commerce committees of the two houses had refused to adopt an amendment excepting export trade from the provisions of the anti-trust laws forbidding combinations for price maintenance, etc. It goes without saying that the Federal Trade Commission, which has not yet been appointed, will not be able to make any recommendations to Congress that could possibly be made the basis of legislation at the coming short session, therefore the officials of the Chamber of Commerce and the business men of the country who are acting with them have found it necessary to undertake an independent campaign and to carry it on with the utmost vigor.

So far as the House committee is concerned there is nothing in the way of early consideration, but in the Senate committee a stumbling block is likely to be encountered in a bill introduced by Senator Reed, of Missouri, the object of which is to restore a series of drastic penalties for violations of the anti-trust laws which were stricken out of the Clayton omnibus anti-trust bill by the conference committee after that measure had passed the two houses. Senator Reed has given notice that he will antagonize any measures that may be taken up by the Senate Judiciary Committee until his bill has been disposed of.

It is understood that the President will send to the Senate soon after Congress meets the names of at least a majority of the members of the Federal Trade Commission. Under the law three of the five members can organize the commission and proceed with its business. The President has already decided to appoint Commissioner Joseph E. Davies, the present chief of the Bureau of Corporations, a member of the commission and it is reliably reported that he will suggest to the commissioners the selection of Mr. Davies as chairman. President Fahey, of the Chamber of Commerce of the United States, is also spoken of as a probable member of the commission, as is also Senator Theodore E. Burton, of Ohio, whose term expires March 4 next and who declined re-election. W. L. C.

L. M. Helbert has been appointed receiver of the Maiwurm German Aluminum Company, Ashland, Ohio.

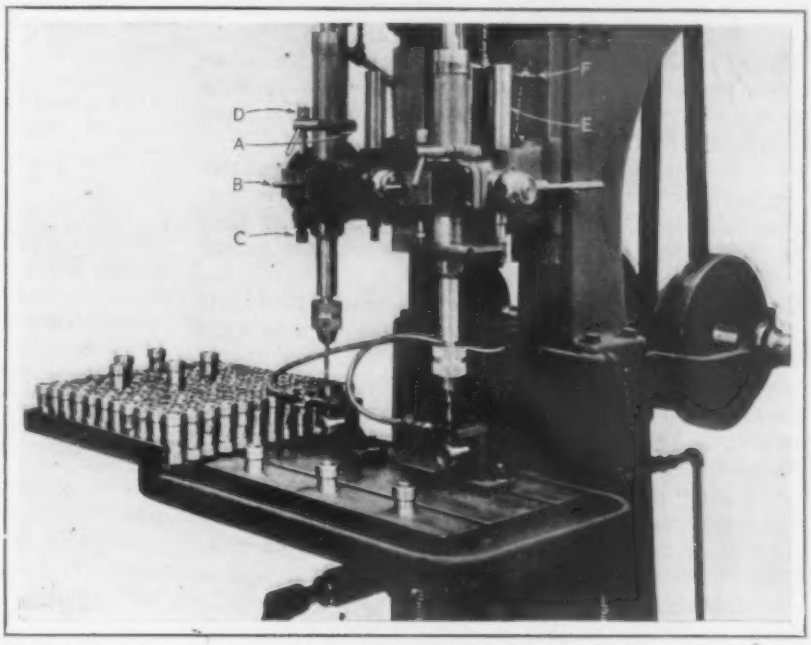
Automatic Power Feed Drilling Machine

The Cincinnati Pulley Machinery Company, Cincinnati, Ohio, has brought out a ball-bearing drilling machine which can be supplied with a number of different feeding arrangements. The machine can be operated either as a full or a semi-automatic tool or the automatic features can be thrown out and the machine operated as a hand feed machine.

In this way it is possible to use the machine in factories where certain pieces are manufactured in large quantities and are handled rapidly, the limiting factor being removing the finished pieces from the jig fixtures and substituting new ones. It can also be employed on other pieces where more than the ordinary time is required between strokes, and this is provided for by throwing out the tripping arrangement for the down feed. The return of the spindle is still automatic, but the power feed is again engaged by throwing the clutch in by hand. All of these automatic features can be thrown out where the work is in small quantities and there is nothing to be gained in the automatic movement of the spindles in either direction. A longer or shorter time for the operator to load and unload the jigs can also be secured by retarding the return of the spindle more or less, or by adjusting the stop collar on the spindle sleeve, so that the spindle will feed idly before touching the work. This adjustment of the stop collar can, of course, be varied so as to give very little waste time between the strokes if that should be found desirable. In the accompanying illustration the automatic feed mechanism is shown, as well as a view of the machine operating on duplicate part work, where a jig is used. In this particular case the job being handled is a steel bushing measuring 1⅜ in. in diameter at the larger end and 1 3/16 in. at the smaller, the diameter of the bore being 13/16 in. The collar at the end of the bushing is ⅝ in. deep, while the total length of the bushing is 1½ in. The work consisted in drilling a 17/64-in. hole in one wall and 1186 of these bushings were turned out in an hour by an unskilled operator.

When the spindle is operated entirely automatically, the length of the stroke is regulated by the position of the upper stop collar A on the sleeve. To start the feed the clutch is engaged by the lever B and the spindle then feeds down. The tripping finger C is put in position and when the desired depth of hole is reached the other tripping finger D trips the feed and the spindle returns rapidly until the drill is clear of the work, after which it returns more slowly until within approximately ⅜ in. of the end of the stroke. Here it travels more rapidly to engage the clutch quickly and the movements are then repeated automatically. The length of the stroke can be regulated to any desired distance between ½ and 5½ in., and the return of the spindle is accomplished by a weight inside the column. The air cushion within the cylinder E retards the return of the spindle, the degree of retardation being regulated by the amount of air allowed to escape through the stop cock F. If it is desired, the feeds can be engaged or disengaged at any time or at any portion of the stroke by manipulating the lever D, thus keeping the machine under hand control at all times.

The general construction of the machine is the same as the builder's No. 3 machine, which was illustrated in *The Iron Age*, September 7, 1911. Three rates of feed are furnished, the usual ones being 0.005, 0.008 and 0.012 in. per revolution of the spindle, although these can be altered to suit conditions. There are four spindle speeds obtainable, but the highest recommended is 3000 r.p.m. The machines are built with one, two, three, four or six spindles, as may be desired, and are arranged for belt drive from an overhead countershaft.



View of a Portion of a Recently Developed Ball Bearing Drilling Machine Showing the Automatic Power Feed Mechanism and the Use of Jigs for Rapid Production Work.

Safety Exposition at Columbus, Ohio

Victor T. Noonan, director of safety of the Ohio Industrial Commission, with headquarters at Columbus, Ohio, visited Cincinnati recently to interest manufacturers in the Industrial Safety Exposition to be held in Columbus January 13 to 16, inclusive. The exposition will be held in Memorial Hall, where provision will be made for showing all kinds of mechanical safeguards. Quite a number of Cincinnati factory heads will have exhibits on hand. In an interview Mr. Noonan expressed the belief that all kinds of laws may be enacted to protect employees from injury, but that mere laws will not accomplish this result. As he puts it: "The workmen themselves must be educated to be more careful, and it is an education of this character that we seek to inculcate."

"A New Conception of Service in Advertising" is the title of a brochure just issued by the Shuman Advertising Company, 110 South Dearborn street, Chicago. In this cogent appeal to those who desire practical results from an advertising campaign most effective points are presented which afford reflection for the thoughtful. The company's methods are so plainly set forth that the client knows what he is to expect. The following question, which constitutes one of the paragraphs, goes directly to the point: "Did you ever stop to think that it takes more real brains, more intimate technical insight, more real study and thought to write a page ad for the readers of *The Iron Age* or Engineering News or Record than it does to write the sort of 'copy' that goes with the readers of a nickel weekly or a 15-cent magazine?"

GANISTER-LINED CONVERTERS*

Their Superiority to Silica Brick-Lined Demonstrated in a Western Steel Foundry

BY JOHN GREGSON

The occasion for this paper is a remarkable run made recently by the Sivyer Steel Casting Company, Milwaukee, Wis., when using a complete ganister lining in its 1-ton converter. Twenty-three blows were made in a single day; 30 blows were made in two consecutive days the following fortnight; and 203 blows in 13 blowing days in June.

Now the vital problem in side blow converter practice is the lining, which has to be more than heat resisting. The fact that silica brick are used in open-hearth furnace construction is no reason that they are the best material for side blow converters. The function of an open-hearth roof is to reflect heat, and it is never called on to stand the cutting action of the oxides formed during refining. The converter lining, on the other hand, must resist a greater absolute temperature than the open-hearth roof and at the same time be subjected to direct contact with the oxides.

For three months after the installation of a 1-ton converter the practice was standard. The converter was lined with silica brick and brick tuyeres were used. The bottom was knocked out at the end of each blowing day. Repairs were made with a mixture of silica grits, silica molding sand and fire clay. With that practice, eight to ten blows a day were made, and all the metal was taken from the converter in hand shanks. As time went on it was noticeable that the amount of repairing material used was increasing from day to day. In chipping away the slag, pieces of brick were frequently loosened up and fell out, until finally there were no brick left just above the slag line and on the back side. Burns through occurred and heats were scrapped. It was evident that the repairing material was not of sufficiently refractory nature to allow an average of 10 blows a day to be maintained.

It was decided to try a ganister mixture for repairs, and one was procured with a rock base that ran about 99 per cent. silica, crushed and mixed with specially prepared fire clay. The first day's trial proved conclusively that the move was in the right direction, and a ganister lining throughout the converter was substituted for the original one of brick—which was in very bad condition after three months of service. This lining held up so well that it was found practicable to leave the bottom in for two or three days. By running the blower at low pressure for three or four hours at night, the converter was cooled sufficiently to allow a man to stay inside long enough to effect small daily repairs, and an average of 10 blows was easily maintained. At that time more metal was needed, and to speed up operations the finished metal was poured into a large ladle and shanked from that. This is standard practice, of course, in 2-ton converters, but the 1-ton converter was unable to stand up under the strain, with only a few minutes between blows. A repetition of the trouble originally found in the silica brick lining took place. In order to further increase the refractory nature of the mixture, a small amount of crushed rock without any fire clay was added to the original mixture, and after a few trials a combination was secured which allows practically continuous blowing.

*From a paper presented at the American Foundrymen Association's convention in Chicago, September 7 to 11, 1914.

The use of silica brick in converters is nearly universal, but the proper ways of using ganister are so little known that men hesitate to experiment after one or two failures. Only a few shops use ganister entirely, most operators having some pet repairing mixture which they apply on a foundation of silica brick. Perhaps one difficulty for the beginner is the necessity of finding a substitute for the customary brick tuyeres. A plate may be made to bolt over the opening onto the wind box, with bosses drilled and reamed to hold pipes. Great care must be taken to have the center of the holes come in the same plane, as it is essential to have the tuyeres level and plumb when the converter stands vertical. Such a plate can be made to fit any style of converter.

The tuyeres having been set in an empty shell, patterns have to be made in accordance with the shape of the converter, for ganister must be rammed, not mudded on. In a vessel that has a removable section, permanent forms are cheapest. On a drop bottom converter, rough lumber can be knocked together and then burned out. In any type of shell it is advisable to use the rough timber in the bottom or tuyere section, as frequently drawing out of a form disturbs the ganister around the tuyeres. The ganister itself should be put in around the forms, in small quantities, and rammed solidly and evenly with an air rammer, save at the tuyeres. At that point the greatest care must be exercised and it is better to use the peen end of a hand rammer.

The cost of the original linings in a 1-ton converter will show little difference between silica brick and ganister, but there is a big saving of time and material in the daily repairs by the latter method. When the tuyeres are badly burned away the old pipes can be drawn out and replaced by new ones, which is a distinct advantage over the old way of ramming ganister around a stick. There is always a soft spot where the patch joins the old lining and the air gradually blows the hole bigger. In one shop where a 2-ton converter with a ganister lining is used an average of eight blows, five days a week, has been maintained for months. It is frequently possible to run an entire week without touching the tuyeres, and no repairs inside the vessel save small patches on the belly. In a 1-ton converter the same bottom and tuyeres often last four days with an average of 30 to 36 blows those four days.

World's Copper Production

The world's production of copper is placed at 2,198,732,130 lb. in 1913, as compared with 2,259,101,580 lb. in 1912. In 1913 the output of the United States was 55.6 per cent. of the world's production. The following figures are for grand divisions:

	1912	1913
Europe	322,092,060	301,148,360
North America	1,484,625,640	1,417,862,810
Central and South America	163,581,280	163,581,320
Africa	36,596,360	50,485,340
Japan	146,826,360	161,376,720
Australia	105,379,880	104,277,580
Total	2,259,101,580	2,198,732,130

The Allen-Bradley Company, Milwaukee, Wis., has brought out a new inclosed type of starting switch designed for use in connection with alternating-current motors of 10 hp. and under. No resistance is included in the switch, but protective devices similar to those installed on the larger switches which were illustrated in *The Iron Age*, October 8, 1914, are provided to give no-voltage and overload protection and to prevent the motor from running single phase.

CUTTING SHORT LEAD SPIRALS

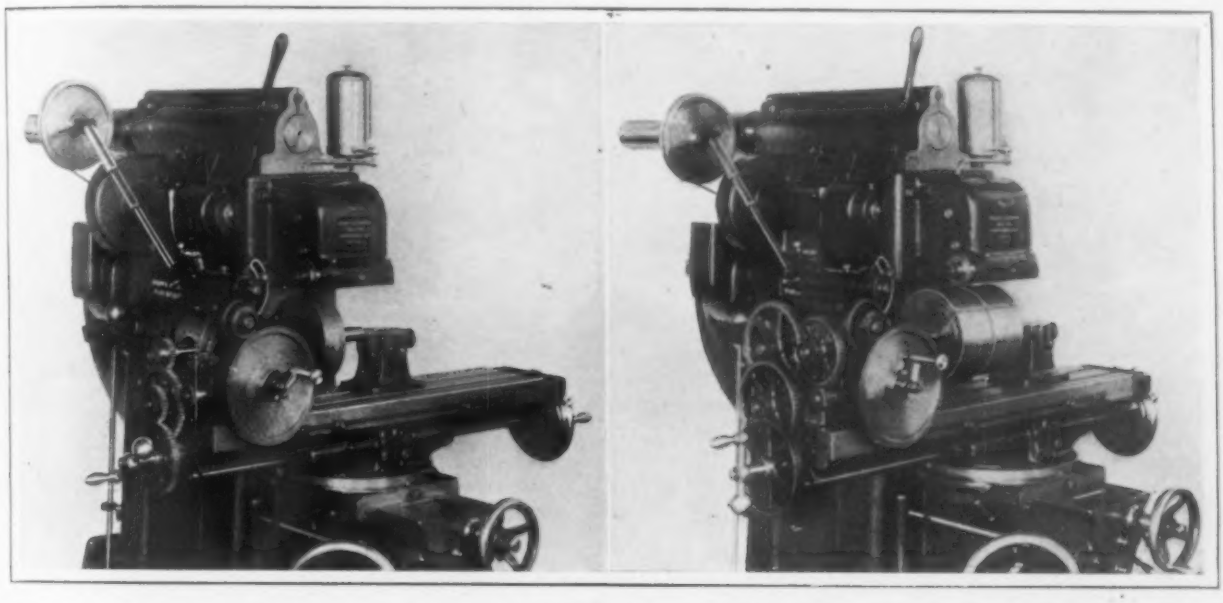
A New Attachment for Handling a Common Type of Milling Machine Work

A milling machine attachment has been recently brought out by the Brown & Sharpe Mfg. Company, Providence, R. I., which is designed for the cutting of short lead spirals, a rather common type of shop-work. In left portion of the engraving the work is a steel drum 6 in. in diameter on which a single thread of 1/18-in. pitch is required, rounded at the bottom and accurate in form and lead. The same attachment, shown at the right, has a different system of gearing.

The method usually employed in milling such leads is to connect the table feed screw direct to the spiral head spindle by gearing of the correct ratio. Therefore the work is rotated from the screw, which means gearing up from the screw to the threads. The mechanism does away with all driving stress on the table feed screw. The regular feed mechanism is thrown out of engagement and the screw is used only to obtain the lead. This is accomplished by connecting the worm shaft of the spiral head to the table screw through triple compound gearing, the ratio of which is 180 to 1. Power is therefore transmitted from the spiral head to the screw in a very high, descending ratio. The turning action of the screw is consequently easy and smooth, resulting in threads accurate in lead and form.

This attachment is arranged to be placed quickly on any regular Brown & Sharpe milling machine which carries a 10-in. spiral head. No fitting or drilling of holes is necessary. Very few extra gears are required in the triple compounding beyond those furnished regularly with the spiral head. A reverse gear and plate may be used in addition to those shown when cutting a thread of the opposite hand.

In the illustration at the right the attachment



Two Views of a Recently Developed Attachment for a Milling Machine Showing It Arranged to Cut Short Lead Spirals and Simple Threads

work in considerable ratio, and placing upon the screw a load that may result in uneven turning and a poor thread.

The chief features of the attachment are the method of applying power for driving the work and the system of gearing for obtaining the lead of the spiral. A small grooved pulley mounted on an expansion bushing on the rear end of the machine spindle drives, by a round belt, the large pulley, shown at the upper left hand corner in the illustrations. This latter pulley is mounted on a bracket that is slipped on the overhanging arm. Sufficient adjustment is provided for keeping the belt tight or for using the same belt crossed or open.

The remainder of the attachment consists of a bracket carrying a short shaft and a swinging arm, the shaft being driven from the grooved pulley by a telescopic shaft and universal joints. The bracket is clamped over the dovetail on the top of the regular spiral head.

In place of the usual index plate is a large gear, through which the power is transmitted from the grooved pulley to the spiral head spindle, thus rotating the work. The movement of the work may be stopped instantly by the small lever on top of the bracket which operates a positive clutch. Eighteen holes are provided in the large gear to be used when cutting double, triple or other multiple is rigged for the same conditions but with a different system of gearing. The spiral head spindle is connected directly to the table feed screw to give the same lead as before, but the gearing is much simpler, as the ratio is only 4.50 to 1. However, this method can only be employed to advantage on single threads, as it does not permit of indexing, while the thread produced in many cases is not as accurate as when using the high ratio gearing.

The cutter may be mounted on a regular rack cutting attachment or a vertical-spindle milling attachment, when used on a universal milling machine. But in case the cutter is large its use is possible only on the milling attachment, while the rack cutting attachment permits the small cutter to be employed. With the assistance of a universal milling attachment in this connection the required work can be done on a plain milling machine, because the necessary spiral can thus be acquired.

The first Industrial Directory to be compiled by the State has just been issued by the Pennsylvania Department of Labor and Industry, Harrisburg, Pa. It is planned to issue another in 1915. In addition to manufacturing establishments the book gives the names, officers and addresses of various organizations of manufacturers, employers, labor unions and employees' associations.

Properties of Southern Foundry Pig Iron*

Its Value to the Foundryman Is Based on a Variety of Advantages as Set Forth by a Well-Known Sponsor

BY JAMES W. M'QUEEN†

In Alabama the first furnace of which we have any record was a small and crude furnace built on Clear Creek, in Franklin County in 1818, on lands now owned by the Sloss-Sheffield Steel & Iron Company, and in the locality where its practically inexhaustible territory of brown hematite ore is now being worked, which ore yields a little better than 50 per cent. in actual furnace practice. While I do not vouch for the story, once in crossing this territory with some of our directors, Jim Sargent, one of the mine foremen, pointed out to us a spot, where he vowed horses were shod before the war with shoes made from the ore as it came from the bank.

Southern foundry iron was never made in any quantity in Alabama until the early seventies, the records showing as follows:

1872.....	11,000 tons	1902.....	1,472,200 tons
1882.....	100,700 tons	1912.....	1,863,000 tons
1892.....	915,300 tons	1913.....	2,058,000 tons

The figures for the last decade include considerable tonnage of basic iron, which I have not been able to separate and deduct from totals given above.

Southern foundry pig iron, in the trade acceptance of the term, means foundry iron produced in Alabama, Georgia, Tennessee and Kentucky. In these States there are all told 82 stacks or furnaces. A number of the stacks cannot be considered as "active," on account of their small size and antiquated equipment, thus preventing competition with the more modern furnaces. This class of furnace will probably never be put into blast again.

AS A COMPONENT OF MIXTURES

Southern foundry pig iron has many characteristics entirely different from Northern iron. The first important difference is due to the ores, most of our Southern ores having self-fluxing qualities and being chemically different from the Northern ores. The main chemical difference is in the phosphorus, which is reflected in the resulting pig iron. The Northern producers, in extreme Northern markets, have found it profitable to imitate Southern iron in phosphorus contents, because of the demand for this element in certain lines of work.

Not only are the silicon and phosphorus of Southern iron appreciated by practical melters, so that its mixture with Northern iron has many converts, but it is known to be of value in neutralizing or balancing chemical elements, and there are also inherent characteristics in its composition producing results in practical tests which confuse the strictly chemical mixer. This is logical, as it is known that 92 to 93 per cent. of all pig iron is metallic iron, so the alloys of carbon, silicon, phosphorus, sulphur and manganese represent only 7 or 8 per cent. of the total weight. While, of course, the chemical elements have their influence on the action of iron in the cupola, there are physical characteristics in Southern foundry pig iron not explainable by the chemist.

In a lengthy argument I once overheard between a chemist and a foundryman, the latter, being pressed for a clearer explanation, said he could only state it was due to the virtue possessed by Southern foundry iron; and we all know what a valuable asset that is.

ADVANTAGES TO THE FOUNDRYMAN

Practical foundrymen have satisfied themselves that the use of the Southern product has demonstrated the following:

1. Southern foundry iron makes a more fluid iron and sharper, cleaner castings.
2. It will produce a softer casting, with the same silicon content as Northern iron.
3. There is less internal shrinkage.
4. There is less contraction, and as a consequence the resulting casting is nearer the size of the mold than when Northern iron is used exclusively.
5. It will produce a finer grained casting without losing softness.
6. There is almost no skin or hair edge noticeable in the broken casting, while the Northern irons chill more rapidly and produce the harder surface.

As these results are becoming more widely known, Southern foundry iron is gaining in value to the melter.

An instance of one experimental test may be of interest. In a certain large foundry making machine tool castings, the chemist advocated a phosphorus content in the mixture of about 0.36, which permitted the use of only 10 per cent. of Southern iron with some reputable brands of Northern iron with phosphorus down to about 0.16 to 0.25. The foundry superintendent, a practical man, contended that better machine castings could be made with a mixture of Southern iron with phosphorus about 0.90. To confirm this contention, two square test bars were made, one by the chemist showing phosphorus 0.36, another by the foundry superintendent, showing phosphorus 0.89. The silicon was about 2 per cent. in each case. These test bars were put on a planer, locked end to end and a ¼-in. cut made from one side, a ½-in. cut from the second side, 1-in. cut from the third side, and 1½-in. cut from the fourth side. The cuttings and the bars showing the grain were submitted to a committee of machine shop experts for determination as to which was the better casting. The committee, having no knowledge as to the analysis of either test bar, or which bar was the one made by the practical man and which made by the chemist, were unanimous in selecting the 0.89 phosphorus bar as the better casting. This contained a large percentage of Southern iron, and the chemist was convinced that Southern iron, with its phosphorus properly used, was a beneficial element.

NEW USES AND NEW MARKETS

When automobile cylinders became a problem for American foundrymen to solve, pieces of cylinders made by the best European makers were analyzed, and it was found that the best French cylinders showed 1.33 phosphorus, the English 1.10 phosphorus, while American makers were using

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* From a paper read at the Birmingham, Ala., meeting of the American Iron and Steel Institute, October 29, 1914.

†Vice-president Sloss-Sheffield Steel & Iron Company, Birmingham, Ala.

only 0.60 phosphorus, and some of the high-priced car builders were buying cylinder castings from France.

Much can be said in favor of buying iron by analysis; but on the other hand there are many causes affecting the success of such practice other than the chemical elements of the iron charged into the cupola. It very often happens that a foundry will buy iron on analysis, and when it comes to the point of using it the iron and other materials are not even weighed but guessed at by a few laboring men. Again, very often they charge miscellaneous scrap, the analysis of which they know nothing about. In such cases the blame cannot in justice be placed on the pig iron.

As I have endeavored to make clear to you, Southern foundry pig has many characteristics entirely different from those of any other iron. During the early days of this industry in the South it stayed very close at home, occasionally venturing on a trip up the river, but never very far. Later, during the eighties, when the industry began to expand—especially in the Birmingham district—the pig acquired roaming habits; it would not stay at home. It made its way up North, all along the great Lakes, into Canada, all over New England, out to the Pacific coast, and down into Mexico. Becoming a veritable tramp, it frequently found its way on board tramp steamers, visited many foreign countries, and entered most of the European ports, and those of Japan, China, Australia and Africa. Wherever it went it brought the joy and sunshine of its native land. To the Northern laborer, sweating and breaking his back on Lake Superior charcoal pig, it was a veritable godsend. It yielded easily to the blows of the sledge. His employer, the foundryman, was grateful for its help. Its smooth and winning way added new luster to the stoves it went to make, and its cheapness enabled the stove maker to reduce his price and sell more. It also enabled the farmer to buy more and better machinery.

Southern pig has always been a friend to everyone, and no satisfactory substitute for it has ever been found. There are people who claim that Southern foundry pig will never exert the power it once had in some markets. Perhaps so, but other markets are growing all the while, and this in spite of the fact that we have been hearing the doom of Southern pig predicted for 20 years. We have weathered far worse storms than this, and we have seen the tide turn in our favor again and again. We believe the time is not far distant when the demand for American iron and steel products of all kinds will tax the capacity of our plants; and when that time comes, Southern foundry pig will not be the "Little pig that stayed at home," but it will go to market every day.

Discussion

BY L. R. LEMOINE*

In his very interesting paper, Mr. McQueen summarized the characteristics of Southern foundry pig iron, and told how this iron finds its way in ever-increasing quantities throughout nearly all this broad land, and now and again into foreign countries. And certainly, for the purposes he mentions, where fluid irons, low in sulphur, are required, there is none better. However, as he also suggests, some Northern irons with like qualities are available; and again, some which afford greater strength in the casting have even less shrinkage. Foundrymen, no doubt, could wish that Southern foundry pig iron embodied those mystic qualities which Mr. McQueen implies; or if perchance it does, they could lay hold of them as evaporators of mix troubles. It is doubtful, however, if there are physical or other characteristics in foundry iron which for all practical purposes cannot be determined in the laboratory. Increasingly difficult specifications for castings and the greater necessity for reducing shop losses on large outputs compel laboratory guidance. This Southern open fluid iron, well adapted to the lighter class of castings, will not alone make a suitable mix for heavier castings in which often greater tensile and transverse strength is required. Hence, where comparatively large tonnages are involved for use in castings often covering a rather wide range in designs and weights, foundrymen, I believe, are rapidly getting away from fracture grading as a guide to mixtures. On the other hand, these high-silicon, high-phosphorus Southern foundry irons are good scrap carriers and as such are much to be desired in the jobbing foundry trade, especially where comparatively small melts and the lighter range of castings are the rule. In the aggregate a considerable tonnage is thus used and often selection by fracture is alone possible.

BETTER METHODS OF GRADING

I quite appreciate Mr. McQueen's contention that sand-cast Southern foundry pig iron is a valuable asset. Strange as it may seem, however, we frequently prefer to base our mixtures on machine cast; and it is our rule to check fracture grading in the laboratory. We have thus often found the reported fracture grading a misnomer and now and again have had to rehandle iron to other locations in the foundry yard, in that it was found unsuited for the mix it would have entered had the fracture grading correctly represented the approximate analysis.

May I be permitted to suggest that from the foundry standpoint, if there is any one factor that would improve Southern foundry pig iron, and Northern iron for that matter, it would be through greater uniformity. Undoubtedly all furnace men have constantly before them quality of product, but have they gone as far as they may in helping the foundrymen who must contend with so many variables. It would help much if foundrymen could always depend on having each cast shipped separately, and the foundry advised in advance as to how it falls within the specified limits as to silicon, sulphur, phosphorus and manganese, and if practicable, as to carbons. Thus on arrival the iron could be better placed on the foundry yard with reference to the mixes of which it should properly form a part. Perhaps the day will come when all modern furnace plants, as one or more have already, will introduce mixers or their equivalent, so that each cast may be more homogeneous and its character the more definitely known. The more nearly the foundryman knows the character of the iron he is using, the more accurately can he make his mix, with a consequent lessening of loss from iron troubles in the foundry.

THE CORPORATION PHASE

There is an economic side to this subject, affecting not only the "sunny South" but indirectly the entire country. Southern foundry pig iron is largely, if not entirely, the product of corporations. Without attempting to discuss the mistaken popular aversion to "big business" regarding which, fortunately, in some directions there is an evident tendency to saner views, it may not be amiss to

*President United States Cast Iron Pipe & Foundry Company, Philadelphia, Pa.

suggest to the producers of iron and steel—South and North—the importance of constantly pointing out to employees and their community how interdependent are the real interests of the people, the employees, and these corporations; that as the latter prosper, so must benefit their stockholders, their employees, and through both the community as a whole; that consequently the people through their representatives should foster these corporations and help them to build up their business so long as it is conducted in a way that is not detrimental to the public. Let us all right-about-face and, taking courage, strive to lead the way in a spirit of warmhearted helpfulness to better things. This is essentially a time to look onward and upward.

FOR RAILROAD RATE ADVANCE

Strong Appeal for Justice to Railroads — The Commission Attacked

Col. George Harvey, in the course of an article on "The Verdict at the Polls," in the North American Review for December, says:

President Wilson proved conclusively his breadth of view and his grasp of understanding of the immediate situation when he wrote, in reply to the appeal of railroad managers, on September 10:

> You ask me to call the attention of the country to the imperative need that railroad credits be sustained and the railroads helped in every possible way, whether by private co-operative effort or by the action, wherever feasible, of governmental agencies, and I am glad to do so, because I think the need very real.
>
> The interest of the producer, the shipper, the merchant, the investor, the financier, and the whole public in the proper maintenance and complete efficiency of the railroads is too manifest. They are indispensable to our whole economic life, and the railroad securities are at the very heart of most investments, large and small, public and private, by individuals and by institutions.
>
> I am confident that there will be active and earnest co-operation in this matter, perhaps the one common interest of our industrial life. * * *
>
> But the emergency is, in fact, extraordinary, and where there is a manifest common interest we ought all of us to speak out in its behalf, and I am glad to join with you in calling attention to it. This is a time for all to stand together in united effort to comprehend every interest and to serve and sustain it in every legitimate way.

THE KEYNOTE OF THE SITUATION

The present condition could not be epitomized more succinctly or more accurately. There can be no real revival of industry while stock exchanges are closed and owners of bonds and shares cannot market their holdings, and it follows with like certainty that an open market cannot be afforded while hundreds of millions of American railroad securities held abroad await only an opportunity for liquidation because of uncertainty respecting interest and dividends.

Here is the keynote of the whole situation. An increase in rates by governmental authority which would help to offset the tremendous loss of $120,000,000 of net operating railroad revenues in the year ended June 30, 1914, would do more than any other conceivable thing to make possible the general trading which is essential to renewal of confidence and business activities in the United States. It is not, moreover, a mere matter of stocks and bonds; a far more vital thing even than that is credit. Railroad companies cannot obtain money for extensions, betterments, or even maintenance when hovering in the shadow of bankruptcy. And this means that manufacturing concerns, ironmakers, steelmakers, tiemakers, and all of the innumerable others who ordinarily supply the railroad companies with all sorts of material are estopped completely from performing their normal functions.

THE CHIEF OBSTACLE

Why? Because higher rates are not really needed? No. That fact has been established beyond question. Because the public objects? No. The public long ago was convinced that the higher costs of living and wages reach to the railroad companies no less than to all others. Because the Interstate Commerce Commission cannot or will not perceive the "extraordinary emergency" mentioned by the President as making for a "very real need"? Possibly, to a degree; but clearly the chief obstacle in the way of first steps toward prosperity, in the way of open markets, in the way of the United States Government, the democratic party, and the democratic President, is Louis Brandeis, counsel and guide of the Interstate Commerce Commission, who solemnly insists that the right to "regulate" rates comprises only the right to "reduce" them. The natural assumption is that if that had been the intent of Congress, Congress would have said so, but Mr. Brandeis holds or at least asserts the contrary view—and the amenably autocratic commission obediently acquiesces.

What to do in such a circumstance? Technically the President is helpless, and Congress, too. Government by commission invariably involves abandonment of authority by the chosen representatives of the people. The President does right, therefore, even while making his own opinion known, in keeping within the strict letter of the law and refraining from interference. But even a commission which plumes itself upon being on a plane with the Supreme Court is no greater than the source of its creation, and we say plainly to the patient President that, if this particular body should persist in its present inexcusably dilatory, incomprehensibly stupid, and arrogantly obdurate course, he can do no more popular thing than to ask a willing Congress to legislate it out of existence.

German Pig Iron and Ore Situation

Germany's pig iron production in the first nine months of this year, according to the official figures published in Stahl und Eisen, was 11,954,985 metric tons as compared with 14,455,886 tons for the same period in 1913. The production for the third quarter of 1914 was 1,561,944 tons in July, 586,661 tons in August and 518,184 tons in September. In September, 1913, the output was 1,590,849 tons, or three times that of September this year.

The most strenuous efforts have been made in Germany to increase the domestic output of hematite iron ore, the supplies of which are now insufficient. The demand for the better grades has been active. Prices have risen 49c. per ton for red hematite and 37c. for spathic grades as compared with quotations before the war. It is reported that a special German administration has been appointed for the French minette district, which is being assisted by an industrial council made up of representatives from the German iron and steel industry.

Some items in Russia's trade in iron and steel this year have just been published. Exports of manganese ore for the first six months of 1914 were valued at $4,016,500 as compared with $4,031,000 for the same period in 1913. Imports of iron sheets to July 1, 1914, were valued at $1,517,500 as against $662,000 to July 1, 1913; of steel sheets, $313,000 as against $110,500; of hand tools, $1,964,000 as against $1,302,500; of dynamos, motors and parts, $2,941,000 as against $1,991,000; of metal-working machinery, $3,752,000 as against $2,474,500; of parts of machinery, $4,907,000 as against $3,549,000; of steam locomotives, $356,500 as against $124,000 and of steam engines, $1,268,500 as against $992,560.

The International Trade Conference of the Mississippi Valley and the Central West recently held at Memphis, Tenn., passed a resolution favoring the organization of a North and South American banking corporation with $500,000,000 capital. John S. Barrett, director general of the Pan-American Union, told the conference that Central and South America need most of all North American money and that if the Mississippi Valley could loan Latin America $500,000,000 in the next five years it would increase its trade with these countries to three times that amount.

THE HUMAN ELEMENT

The Key to Economic Problems

President James Hartness, in his address at the annual meeting of The American Society of Mechanical Engineers, New York, December 1, on "The Human Element—the Key to Economic Problems," pointed out that the world of mechanism has become so intricate and complex that it has gone beyond the capacity of any single individual to comprehend. It is only by selecting the character and limiting the amount of material that is taken into our individual minds that we can hope to accomplish the best results. Under ordinary conditions the mind receives impressions from all directions, which, if unguided, may result in an undesirable trend in our personalilty and ability. By concentrating on those things which are of the greatest use to us, keeping in mind the laws of psychology, we may make a better use of our mental energy. The engineer should devote a part of his time to the care and study of his thinking machine instead of devoting it all to the machine created by that thinking machine. We should not overload our minds with data to the exclusion of thoughts of an initiative character. Continuing, he said in part:

A most important element of the large manufacturing plant is its organization. Without this, the buildings and equipment are of little value. Antagonism to the large organizations should be directed against corrupt practices, and not against the organization itself, which involves the workers' interest. The greatest good to the greatest number requires that we take into consideration each human being, his desires and his needs in finding the work for which he is best endowed.

THE IDEAL LARGE INDUSTRIAL ORGANIZATION

Granting that the large organization is essential in this age, not only in bringing out the best in the individual but in maintaining the supremacy of American industry against foreign competition, may it not be that we may approach the ideal which we may assume to be somewhat as follows for a large industrial plant:

It should have a capital equal to or as large as any competing organization. If possible, it should have a small harmonious board of directors with an able leader. But if the directors merely represent the monied interests without special knowledge of the industry, then it would be sufficient if they were capable of appointing an able staff of officers, the chief executive of which should combine a knowledge of the technical and business side of the industry with the fullest possible conception of the human element. He should stand firmly for the cardinal principles of industrial economics as based on the human characteristics. Each officer should possess some special knowledge essential to the organization, so that the combined staff would have a general knowledge of all the various branches.

The chief executive should make it known that long continuity in service of each man in office will be given the first place in the scheme of management, and this should not only include the officers, but it should be the key to the management of the entire organization. The period of years of service of each man in the organization in a given task or in a given office should compare favorably with that in a competing organization.

It should be the aim of the executives to fill each position throughout the entire organization with someone who considers that position the best place in the world for him. Each officer and each workman should have a live interest in his part of the work. Each one should by specialization become the most efficient in his particular work. The interest of the officer or worker should be maintained by some fitting stimulus, and each one should be protected so far as possible from influences calculated to induce discontent.

Each man should be treated in a respectful manner. Needless direction or heartless correction by an overbearing executive should not be permitted. Criticism or reprimand should not be uttered in the presence of others, for the best control of the organization comes from contact with the better side of man, and that side is not reached by one who rides rough-shod over man's self-respect.

Personal dignity and self-respect is an important characteristic in everyone. It is not the exclusive quality of those whose self-respect is very apparent, nor is it limited to those whose natural conduct and bearing indicate their high regard of the esteem of others. It is to be found in the entire human family, and he who fails to see it, even in an apparently careless person, is blind to a very important part of the human spectrum.

THE VALUE OF A HUMAN REPORT

As these truths become known will it not be possible to formulate general rules of management of industrial organizations that will be of great value to both the investor and the promoter? With such rules the investor could see to what extent an organization conforms to success standards. There would be in addition to the regular treasurer's report a human report. The human report would begin with a description of the directors and go through the entire organization. This report would contain a statement regarding the elements of harmony of organization; of length of service of manager and workers; the frequency of change of methods or article manufactured; intelligence of executives in the management of men; the degree of contentment of each member; the extent to which each man in the organization approaches the best position for which he is endowed and how nearly he obtains the best remuneration for which he is qualified; the extent to which the management recognizes the inertia of habit of both mind and body; the degree in which the various men in the organization approximate the condition of highest efficiency; the extent to which the management goes in expression of appreciation; the degree of its knowledge of the most important characteristics of man as indicated by his inner motives and desires and the condition of his mind as he goes to his home at night. No mention is made here of the conditions of buildings from the point of sanitation and comfort, for such conditions are now closely scanned; but mention has been made of a few of those other conditions that must some day be measured just as we now measure power and other less vital things. The investor who considers this human rating with the treasurer's statement will seldom make a mistake in estimating the true worth of an industrial organization.

Harry W. Bolens, president Gilson Mfg. Company, foundry and gasoline engines, Port Washington, Wis., was re-elected president of the Wisconsin Manufacturers' Association at the annual meeting in Milwaukee on November 25. Other officers elected are: Vice-president, A. Hirshheimer, president LaCrosse Plow Company, LaCrosse; secretary, William George Bruce, Stegeman Motor Car Company, Milwaukee; treasurer, Frank J. Sensenbrenner, Kimberly-Clark Company, Neenah. The association is now especially active in South American trade extension.

ESTABLISHED 1855

THE IRON AGE

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Bars and Pipe in the Iron Column

Comparisons of the production of finished steel with that of wrought iron have usually shown large gains of steel at the expense of iron and wood, while they have not failed to bring out the tenacious hold of iron in certain classes of service. Whatever the cross-currents in a year's statistics, it has been noticed that iron bars have held an important place in the classified statements of finished products—and this whether wrought scrap was high or low, whether rolling mill capacity was taxed to the utmost or only operated from week to week. Broadly the displacement of wrought iron by steel 20 to 25 years ago was due to the rapid cheapening of the latter, its desirability in certain uses on the score of physical properties being a secondary though a well-recognized factor. In the past ten years the change in the total of iron rolled products has been less marked; though there has been, with some fluctuations, the continued expansion of steel output, until in the past two years more steel ingots have been produced in the United States than pig iron—a condition unknown in any other country—and, comparing the five years 1904-1908 with the five years 1909-1913, an actual as well as relative decline in rolled iron. For the former period the average yearly output of finished rolled iron was 1,889,033 gross tons, and in the latter period, 1,645,208 tons, or 13 per cent. less. On the other hand, the average of rolled steel products for the years 1909-1913 was 20,305,436 tons, or an increase of 43.6 per cent. over the average for the previous five-year period. The contrast appears by setting out the figures thus:

Average Production of Iron and Steel Rolled Products in the United States by Five-Year Periods—Gross Tons

	1904-08	1909-13	
Finished rolled iron...	1,889,033	1,645,208	Decrease 13%
Finished rolled steel..	14,137,943	20,305,436	Increase 43.6%

In 1906, when every rolling mill in the country was driven to meet the demand, iron capacity came to the help of steel works, and the iron total ran up to 2,186,557 tons, which was increased to 2,200,086 tons in 1907, the peak year of the decade and the last year of life for many an iron mill. In the same way, though the rally was feebler than in 1906, iron came up in the general expansion of 1912 and 1913 to 1,637,582 tons and 1,678,257 tons, respectively, while the outputs of finished rolled steel were 23,019,259 tons and 23,112,986 tons, no other two years showing such close agreement.

Due to the amounts of scrap that can be had at extremely low prices in certain districts, the iron bar has held its place fairly well in the past decade, the total for 1913 being 1,026,632 tons against 1,322,439 tons in 1905, the first year in which this product was separated in the statistics. But in the same time there was nothing sensational in the increase in steel bars, the total of 2,271,162 tons in 1905 comparing with 2,211,737 tons in 1911, 2,752,342 tons in 1912 and 2,930,977 tons in 1913. In contrast is the situation respecting iron and steel pipe, as shown in the statistics of the production of skelp. It is not so much that iron skelp, which is next to iron bars in tonnage, has shown a remarkable decline, though it has been almost unbroken, as that steel skelp has more than doubled since 1905, the first year for which separate statistics are available. The tonnage and percentage figures appear below:

Production of Iron and Steel Skelp in the United States in 1905-13—Gross Tons

	Iron	Steel	Total	Per cent. iron	Per cent. steel
1905.....	452,797	983,198	1,435,995	31.5	68.5
1906.....	391,517	1,137,068	1,528,585	25.7	74.3
1907.....	444,536	1,358,091	1,802,627	24.6	75.4
1908.....	297,049	853,534	1,150,583	25.8	74.2
1909.....	370,151	1,663,230	2,033,381	18.2	81.8
1910.....	350,578	1,477,616	1,828,194	19.2	80.8
1911.....	322,397	1,658,276	1,980,673	16.3	83.7
1912.....	327,612	2,119,804	2,446,816	13.3	86.7
1913.....	312,746	2,189,218	2,501,964	12.5	87.5

As 1905 and 1906 were high pressure years in every form of iron and steel, the fact that 1912 and 1913 together more than doubled their output in steel pipe is the more noteworthy in view of the panic of 1907 and the several lean years that followed. In brief the story is that from 1905 to 1913 the gain in steel pipe was over 1,200,000 tons, and only 140,000 tons of it at the expense of iron—an example of expansion unparalleled in that time in any other line of production.

To Standardize "Made in U. S. A."

Much has been written since the breaking out of the European war to popularize the slogan "Made in U. S. A.," as a substitute for "Made in America." The Chamber of Commerce of Cleveland, Ohio, has gone a step further and recommends that the proper branding of goods made in this country be standardized by some national organization, also recommending that the Chamber of Commerce of the United States should take charge of this national movement to popularize the slogan "Made in U. S. A." and to standardize it. The Committee on Industrial Development of the Cleveland Chamber, in a report on this subject, states that the advantages of the wide use of "Made in U. S. A." and the recognition of products made in the United States, both by our own people and by foreigners,

are obvious, but that the methods of procedure seem to need some centralized body, national in its scope, which can direct them. The committee reports that there are certain details of the campaign which it believes will require uniform action and could be uniformly agreed upon through the agency of some central national body. While the committee is of the opinion that the uniform slogan "Made in U. S. A." should be generally standardized, it also thinks there should be some provision for the insertion of the names of particular localities, either cities, States or other geographical divisions. In this connection it calls attention, as an example, to the fact that "Made in U. S. A." would be far less significant when applied to such a product as California wine than the designation "Made in California, U. S. A."

Economy in Standardization

Foreign manufacturers frequently express surprise at the large number of sizes and specifications to which some products are made in the United States, pointing out that in recent years standards have been introduced abroad whereby the cost of manufacture and in many cases the cost of fabricating or dealing in the goods have been greatly reduced. We are regarded by many as being behind in this respect, though there are cases in which the advantage is the other way, as in structural shapes. Merely to suggest the wide range in which standardization could be practiced, railroad spikes and rails may be mentioned on the one hand and machine screws on the other. There is no end to railroad spike specifications, almost every railroad having its own so-called "standard" to which spikes must be made or they will be simply useless. It stands to reason that given a certain weight of rail and a certain kind of tie there must be a certain form of spike which will give the best results, and the variation in these conditions cannot call for any large number of forms. With machine screws, of course, there is need for a wide variety, but the present multiplication is quite beyond all needs. Furthermore, the recognition that certain screws are best for all around use would lead to their more general adoption and the special cases would be found to be much less common than is imagined.

What makes the existence of so many sizes and so-called standards the more remarkable is the unwillingness of the majority of American manufacturers to modify their products even in slight degree for the sake of securing export orders. For even a small domestic consumer the manufacturer is usually willing to make almost any modification, even when the practice of his competitors shows the modification to be quite unnecessary, whereas for a foreign buyer he will not make a modification that means simply the adoption of an actual standard prevailing in the country of consumption. There is reason to suspect, indeed, since we really do not know everything, that the adoption of some of these specifications required in the export trade might eventually lead to their use in the domestic trade in many instances.

A case not particularly flagrant but quite illustrative of the inconvenience of needless multiplication of sizes is found in the tin plate industry. There matters have been going from bad to worse. The time was that 14 x 20 and 20 x 28 were tin plate standards, and the great bulk of the tonnage was delivered in those sizes. That was when tin plate was imported. During the first few years of American manufacture other sizes were introduced, and about 15 years ago a dozen or so additional were recognized as standard, others being odd sizes upon which the manufacturer endeavored to obtain an extra. The practice of obtaining extras, however, did not prevail and every buyer became entitled to order whatever size he chose. Until three or four years ago there remained a few sizes still regarded as common, but these have since disappeared. It is to be recognized, of course, that widely different articles are made from tin plate, and a considerable range of sizes in the base material is therefore necessary; but there are well recognized standards as to the cubical contents of cans, and for each such size of can there are employed numerous sizes of tin plate, not simply by different manufacturers, but by the same manufacturer in different seasons. If these changes represented progress toward a standard they would be welcome, but the progress in recent years has been in precisely the opposite direction. The outstanding disadvantage is the economic one that the tin plate mill can scarcely venture at any time to make up stocks. A few years ago the tin mills found much employment, at this season, making up stocks for the rush of demand in the coming season of consumption, but today a tin mill would scarcely be safe in trying to pick out sizes to make for stock equivalent to 10 per cent. of the plates that will be called for next February or March. The raw materials of tin plate are now very cheap, and there is not a mill that cannot produce tin plate more cheaply today than the price at which it would be willing to sell for specification and manufacture next spring.

The manufacturing industries, except as in rare cases they co-operate with engineering societies, are largely without the machinery to adopt and enforce standards. In some part, perhaps, that is the fault of the government, in being so suspicious of anything whereby manufacturers might seem to be getting together; but it is hard to believe, particularly with the "new freedom" and "the new day, with its new understandings," that efforts of manufacturers and consumers to adopt standards whereby the cost of manufacture, distribution and use would be reduced are likely to be discouraged by the government. It is the plain duty of those who would be benefited by the adoption of standards to make the effort.

Bryan's Fling at Manufacturers

Shortly after the recent general election the daily papers published some comments on the result by Secretary of State William J. Bryan. Unmindful of the dignity of his high official position, which should cause him to be ever conscious of the fact that he now represents the people of the United States and not a partisan faction, Mr. Bryan indulged in a gibe at manufacturers. It is significant of the low estimate placed on Mr. Bryan's opinions that no attention was paid by the trade press to this ill-timed deliverance. As indicative of what

well-informed persons who are not manufacturers think of the views advanced by the Secretary of State, we take the following extract from an article by Col. George Harvey on "The Verdict at the Polls," in the North American Review for December:

Mr. Bryan, we regret to observe, detects the age-worn conspiracy of manufacturers to despoil their employees and themselves by "suspending operations or cutting down their forces before the election under conditions which left little doubt that they hoped to arouse opposition to the new tariff law." Drearily we deny the accusation. We do not question Mr. Bryan's belief in what can only be his surmise, but we do wish he would acquaint himself with the facts. Such things may have been done for political purposes years ago, but if ever there has been a time when managements conscious of their responsibility have strained every nerve, against adverse market and financial conditions, to keep the wheels of industry revolving, that time has been the trying year now approaching its unhappy end. We can only hope that Mr. Bryan speaks with accurate foreknowledge when he adds that "now that the election is over the protected manufacturers will resume work."

It may be added that the Underwood-Simmons tariff law, under which manufacturing operations are now being conducted, permits few manufacturers to regard themselves as in the "protected" class. This is a subject on which the Secretary of State, as Colonel Harvey says, should "acquaint himself with the facts." The Congressional leaders of his party, in framing their tariff legislation, assiduously and quite successfully applied themselves to the task of obliterating protection.

CORRESPONDENCE

Coloring Patterns for Castings

To the Editor: My attention has been called to an article on page 1179 of *The Iron Age* of November 19 pertaining to coloring patterns for castings. The writer, as chairman of the specification committee of the American Steel Founders' Society, advocated some years ago, the adoption of a standard practice in this regard. It was accepted by the American Steel Founders' Society and the American Society for Testing Materials.

The practice recommended, and which we are pleased to say is becoming more and more the practice among all of the foundries and their customers, is to have the body of the pattern shellaced, as usual, the core print indicated in black and the finished surface in red. This method of painting seems to suit most pattern shops, and as it has been in our specifications and the specifications of the American Society for Testing Materials, it occurs to the writer that it might be advisable to advocate the same system for gray iron foundries.

L. E. THOMAS, General Manager,
Birdsboro Steel Foundry & Machine Company.
Birdsboro, Pa., November 25.

The Industrial Association, Cincinnati, is a new organization, succeeding the Employers' Association and the Federation of Team Owners and Allied Interests, with headquarters in the Odd Fellows Temple. Its object is to promote and protect the business interests of the community, to educate the public on pending and existing legislation affecting both employer and employee, and as far as possible to counteract the effect of unwise legislative proposals. The association starts out with a membership of over 2000, which includes prominent machine-tool manufacturers and foundrymen.

Chino-Japanese Blast Furnaces on American Lines

The visit to the United States of Dr. M. Oshima, the well-known Japanese metallurgical engineer, lends interest to the plans which have been developed this year by which Japanese capital is now interested in the Hanyehping Iron & Coal Company, Ltd., which operates the Hanyang Iron & Steel Works at Hanyang, China. Dr. Oshima is chief technical adviser for the above company. He visits the United States in company with Dr. Z. T. K. Woo, superintendent of the Hanyang Works, and reference was made in *The Iron Age* of November 19 to the plans for building two new blast furnaces in connection with which the visit is made. Dr. Oshima and Dr. Woo are in Pittsburgh this week. The relation of Japanese capital to China's well-known iron and steel works is shown in the following, prepared by Consul-General J. H. Arnold, Hankow, China, written September 16 and appearing in a recent issue of Daily Consular and Trade Reports:

The Hanyehping Iron & Coal Company, Ltd., commonly known from its chief plant as the Hanyang Iron & Steel Works, has coal mines at Pinghsiang, Kiangsi province, and iron mines at Tayeh, Hupeh province. The Hanyehping company, the Japanese Iron Works and the Yokohama Specie Bank entered into joint agreements in the spring of 1914, by which the bank was to lend the Chinese company about $7,500,000, to be redeemed within 40 years through the sale of iron ore and pig iron to the Japanese Iron Works. In March, 1914, the shareholders of the Hanyehping company agreed to the proposed joint control of the company by the management and the Chinese Government.

Practically all the pig iron exported in 1913 went to Japan. The Hanyang Iron & Steel Works are now in full operation; but owing to the contracts with the Japanese, the prospects for increased shipments of iron to the United States are not promising. The blast furnaces, which were frozen and partly destroyed during the revolution of 1911, have been repaired and a new furnace is building. The output of the Hanyang Iron & Steel Works for the only two months of 1912 in which the plant was in operation and for the year 1913 was as follows: 1912 (2 months)—pig iron, 7889 tons; steel, 2521 tons; steel rails, 1120 tons; 1913—pig iron, 97,633 tons; steel, 41,961 tons; steel rails, 16,743 tons. The production of coal at the company's Pinghsiang mines amounted to 579,633 tons in 1913, compared with 232,373 tons in 1912; that of coke to 174,665 tons in 1913, compared with 29,109 tons in the one month of 1912 in which it was produced. The output of iron ore at the Tayeh mines was 192,980 tons in 1912 and 485,865 tons in 1913. The projected railroad construction in this district is creating such a demand for rails that the entire output of pig iron of this company, after satisfying the Japanese pig-iron contract, must be used in producing rails for the Hukuang Railways.

Preliminary figures taken from the accident reports received by the Bureau of Statistics of the Pennsylvania State Department of Labor and Industry show that two persons are killed on each working day in the industries of Pennsylvania, while 125 are hurt more or less seriously. Figures compiled from reports for the first eight months of this year, the first in which the accident report system has been working, show 291 persons killed.

The Kipnis Company, 9 to 15 Murray street, New York, has been incorporated with a capital stock of $25,000, to manufacture a patented automatic chuck for use on drill presses, lathes and screw machines. A. Kipnis is president; L. Pollack, vice-president; Arthur Hirshon, secretary.

Carpenter & Smead, 6 East Lake street, Chicago, have been appointed district representatives in Chicago territory for the Lakeside Forge Company, Erie, Pa., maker of drop forged and adjustable wrenches and a full line of automobile and agricultural implement forgings.

Lake Superior Iron Ore Shipments 32,021,900 Tons in 1914

The last cargoes at several iron ore docks on Lake Superior were loaded on Saturday, November 28, but loading continued at the Chicago & Northwestern docks at Escanaba on Monday, November 30. Reports to *The Iron Age* from the 11 shipping docks on Lake Superior and Lake Michigan show that the total movement of Lake Superior ore by water in the season of 1914 was 32,021,900 tons. In this total is included an estimate for one cargo which was being loaded at Escanaba and had not left the dock on December 1. The total shipments in November were 1,070,095 tons. The water shipments in 1913 were 49,070,478 tons, so that the falling off is roundly 17,050,000 tons. Shipments by ports for the season are given below, together with the comparison with the three preceding years:

Iron Ore Shipments from Upper Lake Ports—Gross Tons

	1914	1913	1912	1911
Escanaba	3,664,454	5,399,444	5,234,655	4,278,445
Marquette	1,755,726	3,137,617	3,296,761	2,200,380
Ashland	3,363,419	4,338,230	4,797,101	2,429,290
Two Harbors	5,610,262	10,075,718	9,370,969	6,367,537
Superior	11,309,748	13,788,343	14,240,714	9,920,490
Duluth	6,318,291	12,331,126	10,495,577	6,934,269
Total by lake	32,021,900	49,070,478	47,435,777	32,130,411
Total all rail		876,638	785,769	662,719
Total shipments		49,947,116	48,221,546	32,793,130

It will be noticed that Superior has been far in the lead in shipments this season, the total for that port being nearly equal to the movement from both Duluth and Two Harbors. As is well known, the Steel Corporation's lease of Great Northern ore properties expires at the end of this year and the heavy Superior shipments represent the effort to get out all the ore called for by the minimum provisions of the lease. Minnesota's percentage of the total Lake Superior shipment this year, due to the special activity on the Great Northern properties, is greater than heretofore, being close to 73 as against 72 in 1913, the previous maximum.

The Mansfield Sheet & Tin Plate Company will be incorporated this week for the purpose of taking over the long idle plant of the former National Sheet Steel Company, Mansfield, Ohio. The plant is now being remodeled. It had three hot and two cold mills and to these three hot and two cold mills are being added. The plant will then have six hot and four cold mills. Other improvements are a Mesta rope drive, a 36 x 60 in. engine, new boilers and all necessary equipment to manufacture special sheets for automobile and stove work. It is expected to have the plant ready for operation about January 1. W. H. Davey will probably be president of the company. He recently resigned as general manager of the Massillon Rolling Mill Company but is still vice-president of that company.

Edwin H. Jonson and Richard B. Franken, formerly connected with the Wiener Machinery Company, have formed a partnership under the name of the Engineering Sales Company, with offices at 114 Liberty street, New York. They will handle iron castings and wrought-iron and steel work and are consummating arrangements to represent a number of manufacturers.

The Pierce-Arrow Motor Car Company, Buffalo, N. Y., has purchased land adjoining its present plant having a frontage of 594 ft. on the New York Central Belt Line, with a depth of 657 ft., on which new buildings for manufacturing motor trucks will be erected. The purchase will give the company a total of about 1600 ft. of railroad frontage.

The American Die & Tool Company, Second and Buttonwood streets, Reading, Pa., announces that it intends to discontinue the manufacture of reamers entirely. At the present time the automobile parts and small tool departments of the company are very busy.

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Scientific Management Meeting

The Society to Promote the Science of Management will hold its annual meeting at the Engineering Societies Building, New York City, on Friday evening, December 4, and on Saturday morning, afternoon and evening, December 5.

For the Friday evening session a paper is announced on "Current Wage Theories," by Prof. Chester A. Phillips, assistant professor of economics, Dartmouth College, and the discussion is to be opened by Wilfred Lewis, Tabor Mfg. Company, Philadelphia.

After the business meeting of Saturday morning a paper is to be presented at 10:30 a.m., by Robert G. Valentine, industrial counselor, Boston, on the function of the industrial counselor and possible relations of scientific management and labor unions.

At 2:30 p.m., Saturday afternoon, a paper is to be presented on "The Function of the Supervisor of Personnel," by Ernest M. Hopkins, supervisor of personnel, the Curtis Publishing Company, Philadelphia, and the discussion is to be opened by Morris L. Cooke, director of public works, Philadelphia. In the evening a round table discussion on systems of wage payment is announced opened by Charles W. Mixter, on "A Proposed Modification of Task and Bonus."

Reports concerning the taking of bids this month by the Imperial Steel Works of Japan for important additions are premature. Through Takata & Co., New York and London, plans are being prepared for considerable additions to the rolling mill equipment of these works, with the probable addition of new departments of manufacture, but it is expected that some weeks will elapse before the matter is in shape for bids.

The Iron and Metal Markets

A BROADER IRON MARKET

Pig-Iron Buying in All Districts

Greater Activity in Finished Material Looked for in December—More Barb Wire Exports

The buying movement in pig iron which started with large contracts at Buffalo, as reported last week, has extended to other districts. Cleveland, Pittsburgh, Cincinnati, Chicago and St. Louis in particular have participated. At the same time there are signs in the finished steel trade pointing to considerable activity in December, making that the best month in the final quarter, in point of tonnage.

Pittsburgh sentiment is more hopeful, in the face of better buying of bars and indications that in several other lines consumers are willing to take hold at the low prices reported in connection with some contracts for the first quarter. The next fortnight is expected to develop whether to a considerable extent 1.05c., Pittsburgh, will become the basis for business in plates, shapes and bars in that period.

Operation of mills in December is not likely to be at a much greater rate than in November, but the opinion is general that this month will lay the foundation for fuller running schedules in January.

The steady improvement in the money and security markets has given the steel trade ground for hopefulness regarding projects that mean tonnage for the mills. Early decisions are likely, for example, in some good-sized business on which Eastern shipyards have been figuring and at Pittsburgh a pipe line, which the war put aside, is now looked on as a good possibility. Fifty thousand tons of plates are involved.

Foreign inquiry for barb wire is again of large proportions, after a lull. It comes from a variety of sources and lots are talked of running up to 10,000 tons. Competition on previous purchases by the governments at war brought variations of $4 to $5 a ton in the bidding. Wire rod sales for export include 9500 tons by one interest and 10,000 tons more are wanted.

The Standard Oil Company is about to build another 500-ft. tank steamer, taking 3000 tons of plates and shapes and there is sharp bidding by Eastern yards, some of which are getting near the end of large contracts for Panama steamers.

The prominence given to the 12,000 tons of rails bought by the Santa Fé indicates the extremity of the mills that are waiting for railroad orders. Beyond a 5000-ton inquiry from Australia and a 6000-ton sale to Tasmania made by an English mill at $29.80, international rail buying has halted. Several hundred cars are hanging over the market, including 500 for the Union Tank Line.

Inquiry for sheet bars from sheet and tin-plate mills has increased in the Pittsburgh district and the basis for first quarter contracts will probably be established shortly.

Large tin plate contracts for 1915 are pending and there are indications that a heavy business has been done at 10 cents or more below the $3.25 basis early talked of in connection with next year's requirements. Since Great Britain prohibited tin plate exports, inquiry has come to this country from a number of neutral European countries.

Chicago territory is again getting distinction in prices going from $1 to $2 below a ton below the Pittsburgh base. Plates have sold for early delivery at the equivalent of 1c., Pittsburgh. The bar iron market has developed a new low point at less than 0.90c., Chicago district mill.

Our London cable indicates better buying in some lines and a more confident feeling, as the lack of Continental steel becomes more and more a market factor. The shipments of ferromanganese from Great Britain to the United States were 26,500 tons in September and October, against 30,000 tons in the corresponding months last year. At the present rate of steel production in the United States these shipments would last domestic buyers of ferromanganese nearly six months.

Pig iron prices were sacrificed both by Northern and Southern sellers to bring about the large movement reported from the Central West. Southern No. 2 was sold freely at $9.75, Birmingham, while some business in St. Louis territory went at $9.50. Northern iron sales in central territory were largely at $12.50, Ohio furnace. The rank and file of foundries have taken part in the buying, though some large interests are still uncovered. At Chicago the $12.50 and $12.75 iron is disappearing from the market and $13 at furnace is now generally quoted. It is a little early to say whether the $1 advance made by Buffalo furnaces will be established.

Lake Superior iron ore shipments ended this week with a total of 32,021,900 tons, against water shipments of 49,070,000 tons in 1913.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.

	Dec. 2, 1914.	Nov. 25, 1914.	Nov. 4, 1914.	Dec. 3, 1913.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia...	*$14.25*	$14.50	$14.50	$15.50
No. 2, Valley furnace...	12.75	12.75	12.75	13.50
No. 2 Southern, Cin'ti...	*12.65*	12.90	12.90	14.25
No. 2, Birmingham, Ala..	*9.75*	10.00	10.00	11.00
No. 2, furnace, Chicago*.	**13.00**	12.50	12.75	14.75
Basic, del'd, eastern Pa..	*13.50*	14.00	14.00	15.00
Basic, Valley furnace....	**12.50**	12.40	12.50	12.75
Bessemer, Pittsburgh....	14.70	14.70	14.55	15.90
Malleable Bess., Ch'go*..	**13.00**	12.75	13.00	14.75
Gray forge, Pittsburgh...	13.40	13.40	13.40	14.15
L. S. charcoal, Chicago..	15.75	15.75	15.75	15.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh.	19.00	19.00	19.50	20.00
O.-h. billets, Pittsburgh..	19.00	19.00	19.50	20.00
O.-h. sheet bars, P'gh...	20.00	20.00	20.00	21.00
Forging billets, base, P'gh.	24.00	24.00	25.00	24.00
O.-h. billets, Phila.....	21.40	21.40	21.40	22.50
Wire rods, Pittsburgh...	25.00	25.00	25.50	25.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Old Material, Per Gross Ton:	Dec. 2, 1914.	Nov. 25, 1914.	Nov. 4, 1914.	Dec. 3, 1913.
Iron rails, Chicago	$11.00	$11.00	$11.00	$13.50
Iron rails, Philadelphia	13.00	13.00	13.00	17.00
Carwheels, Chicago	9.50	9.50	10.50	12.00
Carwheels, Philadelphia	9.50	9.50	9.50	12.00
Heavy steel scrap, P'gh	10.00	10.00	10.00	11.25
Heavy steel scrap, Phila.	9.25	9.25	9.50	10.00
Heavy steel scrap, Ch'go	**8.25**	8.00	8.50	9.00
No. 1 cast, Pittsburgh	10.50	10.50	10.50	12.00
No. 1 cast, Philadelphia	11.00	11.00	11.00	12.50
No. 1 cast, Ch'go (net ton)	8.50	8.50	8.75	10.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.12	1.12	1.12	1.25
Iron bars, Pittsburgh	1.15	1.15	1.15	1.35
Iron bars, Chicago	0.90	0.95	0.97½	1.15
Steel bars, Pittsburgh	1.10	1.10	1.10	1.25
Steel bars, New York	1.26	1.26	1.31	1.41
Tank plates, Pittsburgh	1.05	1.05	1.10	1.20
Tank plates, New York	1.26	1.26	1.26	1.36
Beams, etc., Pittsburgh	1.10	1.10	1.10	1.25
Beams, etc., New York	1.26	1.26	1.26	1.41
Skelp, grooved steel, P'gh	1.10	1.10	1.10	1.25
Skelp, sheared steel, P'gh	1.15	1.15	1.15	1.35
Steel hoops, Pittsburgh	1.25	1.25	1.25	1.45

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	1.85	1.85	1.90	1.90
Galv. sheets, No. 28, P'gh	2.85	2.85	2.90	2.90
Wire nails, Pittsburgh	1.55	1.55	1.60	1.55
Cut nails, Pittsburgh	1.60	1.60	1.60	1.65
Fence wire, base, P'gh	1.35	1.35	1.40	1.35
Barb wire, galv., P'gh	1.95	1.95	2.00	1.95

Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$1.50	$1.50	$1.60	$1.75
Furnace coke, future	1.75	1.75	1.75	1.85
Foundry coke, prompt	1.90	1.90	2.00	2.50
Foundry coke, future	2.15	2.15	2.15	2.75

Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**13.00**	12.62½	11.50	15.00
Electrolytic copper, N. Y.	**12.75**	12.50	11.25	14.62½
Spelter, St. Louis	**5.20**	5.15	4.90	5.00
Spelter, New York	**5.35**	5.30	5.05	5.15
Lead, St. Louis	3.67½	3.77½	3.37½	3.95
Lead, New York	3.80	3.90	3.50	4.10
Tin, New York	35.15	33.87½	31.80	38.50
Antimony, Hallett's, N. Y.	15.00	15.00	15.00	7.10
Tin plate, 100-lb. box, P'gh	$3.15	$3.15	$3.15	$3.40

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal on plates, shapes, etc., is 46c.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.05c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.10c.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.35; galvanized, $1.75. Galvanized barb wire and fence staples to jobbers, $1.95; painted, $1.55. Wire nails to jobbers, $1.55. Woven wire fencing, 73 per cent. off list for carloads; 72 off for 1000-rod lots; 71 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized	1.90	1.95	2.00	2.05	2.15	2.25	2.65	2.75

Wire Rods.—Bessemer, open-hearth and chain rods, $25.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from November 2, 1914, and iron pipe from June 2, 1913, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	74	53½	⅛ and ¼	66	47
½	78	67½	⅜	65	46
¾ to 3	81	72½	½	69	56
			¾ to 2½	72	61

Lap Weld

2	78	69½	1¼	56	45
2½ to 6	80	71½	1½	67	56
7 to 12	77	66½	2	68	58
13 and 14	63½	..	2½ to 4	70	61
15	61	..	4½ to 6	70	61
			7 to 12	68	55

Reamed and Drifted

1 to 3, butt	79	70½	1 to 1½, butt	70	59
2, lap	76	67½	2, butt	70	59
2½ to 6, lap	78	69½	1¼, lap	54	43
			1½, lap	65	54
			2, lap	66	56
			2½ to 4, lap	68	59

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	69	58½	⅜	63	52
½	74	67½	½	67	60
¾ to 1½	78	71½	¾ to 1½	71	62
2 to 3	79	72½	2 and 2½	72	63

Lap Weld, extra strong, plain ends

2	75	66½	1½	65	59
2½ to 4	77	68½	2	66	58
4½ to 6	76	67½	2½ to 4	70	61
7 to 8	69	58½	4½ to 6	69	60
9 to 12	64	53½	7 to 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	64	57½	½	57	49
¾ to 1½	67	60½	¾ to 1½	60	52
2 to 2½	69	62½	2 and 2½	62	54

Lap Weld, double extra strong, plain ends

2	65	58½	2	55	49
2½ to 4	67	60½	2½ to 4	60	54
4½ to 6	66	59½	4½ to 6	59	53
7 to 8	59	48½	7 to 8	52	42

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.	49
2½ and 2¾ in.	65	2¼ in.	45
3 and 3¼ in.	70	2½ to 2¾ in.	54
3½ and 4½ in.	72	3 and 3¼ in.	57
5 and 6 in.	65	3½ and 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, as follows, f.o.b. Pittsburgh, terms 30 days

net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.30 to 1.35
Nos. 9 to 10	1.35 to 1.40
Nos. 11 and 12	1.40 to 1.45
Nos. 13 and 14	1.50 to 1.55
Nos. 15 and 16	1.60 to 1.65

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.50
No. 12	1.50
Nos. 13 and 14	1.55
Nos. 15 and 16	1.60
Nos. 17 to 21	1.65
Nos. 22 and 24	1.70
Nos. 25 and 26	1.75
No. 27	1.80
No. 28	1.85
No. 29	1.90
No. 30	2.00

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	1.85
No. 12	1.95
Nos. 13 and 14	1.95
Nos. 15 and 16	2.10
Nos. 17 to 21	2.25
Nos. 22 and 24	2.40
Nos. 25 and 26	2.55
No. 27	2.70
No. 28	2.85
No. 29	3.00
No. 30	3.15

Pittsburgh

PITTSBURGH, PA., December 1, 1914.

Indications now point to a revival in the steel trade. Events of the past week justify the belief that there will be activity in selling this month and in January, but at low prices. There is a good deal of inquiry from tin-plate and sheet mills for sheet bars for first-quarter and first-half delivery. The new demand for finished iron and steel is better. Consumers have been watching the market closely, and believing that bottom has been reached are in more of a buying mood than for months. Heavy foreign sales of barb wire and other products are still being made. A pipe-line project, dropped when the war started, has been revived and may be placed this week. It involves close to 50,000 tons of plates. A recent order placed with the Standard Chain Company by the Allies calls for $525,000 worth of material. A sale of 6500 tons of rods has been made by a local mill for export, with a good deal more business pending. The whole situation looks better from every standpoint, except that of prices, than for some months.

Pig Iron.—W. P. Snyder & Co. report the average price of basic iron in November at $12.477, and of Bessemer $13.6375, both at Valley furnace, to which 95c. should be added for Pittsburgh delivery. Compared with average prices for October, basic shows a reduction of about 37c. a ton and Bessemer 30c. a ton. There has been a good deal of activity in the local market the past week, and one prominent pig-iron interest has made some fairly heavy sales. These include 6000 tons of basic—1000 tons a month from January to June at $12.50—and 5000 tons of basic for first quarter at $12.50, both made to local open-hearth steel interests. The same interest reports sales of 6000 and 2000 tons of No. 2 foundry at $12.75, 900 tons at $12.75, 500 tons of Bessemer at $13.75 and 3500 tons of gray forge at $12.50, Valley furnace. There have also been sales of 2000 to 3000 tons of malleable Bessemer at $12.75, Valley furnace. These sales have firmed up the local pig-iron market and Bessemer is strong at $13.75 and basic at $12.50, Valley furnace. We quote Bessemer iron at $13.75; basic, $12.50; malleable Bessemer, $12.75; No. 2 foundry, $12.75 to $13; gray forge, $12.50, all at Valley furnace, with a freight of 95c. a ton for delivery in the Cleveland or Pittsburgh district.

Billets and Sheet Bars.—There is a good deal of inquiry for sheet bars for first quarter. The Carnegie Steel Company will likely make a price in a short time for this delivery. We note a sale of 250 tons of sheet bars for prompt shipment at about $20, Pittsburgh, and 1000 tons of forging blooms at $25, delivered to buyer's mill, the blooms netting the seller about $24.50 at mill. The asking price of sheet bars is $20, f.o.b. Pittsburgh, but on desirable orders probably $19.50 could be done for early delivery. We quote Bessemer and open-hearth billets at $19, and Bessemer and open-hearth sheet bars $19.50, f.o.b. maker's mill, Youngstown; Bessemer and open-hearth billets, $19, and Bessemer and open-hearth sheet bars, $20, f.o.b. maker's mill, Pittsburgh. Forging billets are quoted at $24 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. Axle billets are quoted at $21 to $22, f.o.b. Pittsburgh.

Ferroalloys.—It is stated that no shipments of English ferromanganese have been made since the embargo was declared, but a good deal was on the water en route for this country, and it is now coming in to seaboard points. So far, consumers have been getting prompt deliveries. For forward shipment it is still held at $68, seaboard, but dealers who have stocks at Baltimore are asking $75 and higher, for prompt shipment. We note sales of two carloads of 50 per cent. ferrosilicon at $73, delivered at buyer's mill. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $19; 11 per cent., $20, and 12 per cent., $21, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Steel Rails.—It is strongly denied that Russia has placed an order in this country for 30,000 tons of steel rails. Chile has bought 5000 tons of standard sections from the United States Steel Products Company, and the rails will be rolled at the Edgar Thomson mills of the Carnegie Steel Company. No advices have yet been received in this country of the placing of the Norwegian order. An inquiry is in the market from Australia for 5000 tons of standard section rails, and the business is expected to come to this country. The domestic demand for standard sections is dull and only for small lots for prompt shipment. The new demand for light rails is better, some lumber companies placing orders, but business from coal-mining companies is quiet. The Carnegie Steel Company received new orders and specifications in the past week for close to 2000 tons of light rails. We quote standard section rails, made of Bessemer stock, at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10 lb. sections, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. Extras over the above prices are as follows:

Bond drilling, one hole	$0.045 per 100 lb.
Bond drilling, two holes	0.090 per 100 lb.
Bond drilling, one hole in flange	0.090 per 100 lb.
Bond drilling, two holes in flange	0.180 per 100 lb.
All 30 ft. and special lengths, down to but not including 12 ft.	0.045 per 100 lb.
Special lengths, 12 ft. and under	0.090 per 100 lb.
Notching	0.025 per 100 lb.

The above prices are for carload lots, the usual differentials being allowed for large lots.

Structural Material.—New inquiry is still very light. The McClintic-Marshall Company has taken 200 tons for new machine shops for the Ligonier Valley Railroad, to be built at Ligonier, Pa., 500 tons for the Hudson Motor Car Company for extensions to buildings at Detroit, and 500 tons of dock work for the Detroit & Cleveland Navigation Company, Cleveland, Ohio. The Riter-Conley Mfg. Company has taken 145 tons of bridge work for the Pennsylvania Railroad. We quote beams and channels up to 15-in. at 1.10c., f.o.b. Pittsburgh, for delivery over remainder of this year and first quarter of 1915. On a very desirable order for prompt shipment, 1.05c. could be done.

Plates.—The United States Steel Products Company has taken 15,000 to 16,000 tons of steel plates for a water line to be built at Coolgardie, Australia, and the plates will be rolled in the Homestead works of the Carnegie Steel Company. The Riter-Conley Mfg. Company has taken about 300 tons for a rolling press dam for the United States reclamation service in Colorado. The Pressed Steel Car Company has taken 100 tank cars for

the Atchison, Topeka & Santa Fe, and 200 center sills for the Pere Marquette. It is said several leading railroads have quietly sent out inquiries for a considerable number of steel cars, but details of these cannot as yet be obtained. It is believed that plate business will shortly be much better, but prices will rule low until mills have more orders on their books. Several leading mills will accept desirable orders for sheared plates for delivery through first quarter at 1.05c. at mill. We quote ¼-in. and heavier plates at 1.05c. to 1.10c., Pittsburgh.

Wire Products.—We note a continued heavy foreign demand for barb wire, and several local mills report they are entering a good deal of business for foreign shipment. Several barb wire mills are running full, having all they can do for 30 days or more. This is the off season in the wire-nail trade, the domestic demand being dull and specifications quiet. Prices on wire products to domestic users are weak, nails having sold recently as low as $1.50 per keg. We quote: wire nails at $1.55; plain annealed wire, $1.35; galvanized barb wire and fence staples, $1.95; painted barb wire, $1.60, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. off for cash in 10 days. We quote steel cut nails at $1.60, f.o.b. Pittsburgh, in carload lots. We quote woven wire fencing at 73 per cent. off in carload lots, 72 on 1000-rod lots and 71 on smaller lots, all f.o.b. Pittsburgh.

Shafting.—As yet there is no betterment in the new demand for shafting, which does not represent more than 25 per cent. of capacity, but makers believe that early in 1915 conditions will be better. Specifications from the automobile trade are fairly active, but from other large consumers are quiet. We quote cold-rolled shafting at 66 to 67 per cent. off, delivered in base territory.

Iron and Steel Bars.—Reports are that some large business in steel bars is under negotiation for foreign shipment, but no details have been given out. The domestic demand is quiet and specifications against contracts are not active. Two of the largest makers of steel bars in this district are entering orders for delivery through first quarter on the basis of 1.10c. at mill, and possibly 1.05c. could be done on a very desirable specification. The new demand for iron bars is dull and prices are weak. The amount of common iron bars made in the Pittsburgh district is relatively small, as most of the local puddling plants roll high grade bars for which better prices are obtained than for common iron bars. We quote merchant steel bars at 1.10c. for delivery over remainder of the year and first quarter of 1915. We quote common iron bars at 1.15c., f.o.b. Pittsburgh.

Tin Plate.—The price of tin plate for all of 1915 delivery will probably be announced this week. Consumers are importuning the makers to do so. Statements that two leading companies had sold their entire output for 1915 are officially denied, but two have sold a fair amount for delivery on the Pacific coast in the first quarter. The outlook now is that prices of tin plate in 1915 will be low, in spite of the fact that the biggest business, from the standpoint of tonnage, ever known is expected. Two or three new mills that have started in the past year are said to be naming low prices, and this is having the effect of unsettling the price situation. A sale of 30,000 boxes was made recently by a new producer at a very low figure. It is still the general belief that the price for 1915 will not be above $3.25 per base box. On the small current orders being placed, the general market is about $3.25, but this is sometimes shaded 5 to 10c. per box, or more. We quote 100 lb. 14 x 20 terne plates at $3.10 to $3.20, f.o.b. Pittsburgh. At present operations among the tin-plate mills are on a basis of 50 per cent. or less.

Sheets.—Buyers are showing a little more interest in the market, and new orders and inquiries for sheets are slightly better. It will require, however, a very large amount of new business to be placed before the mills can run to full capacity. At present operations are on a 35 to 40 per cent. basis. We quote No. 28 Bessemer black sheets at 1.85c.; No. 28 galvanized, 2.85c.; Nos. 9 and 10 blue annealed, 1.35c. to 1.40c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Wire Rods.—Some heavy sales for shipment abroad are being made, which aggregate a much larger tonnage than generally credited. A local interest made one sale recently of 6500 tons, another of 1500 tons and a third of 2000 tons. Probably 10,000 tons are under negotiation at present. These heavy foreign sales have strengthened prices to some extent. A month ago rods sold as low as $24 at mill, but makers generally are now asking $25 for delivery over first quarter, but for prompt shipment possibly $24.50 could be done. We quote Bessemer, open-hearth and chain rods at $25, f.o.b. Pittsburgh.

Skelp.—The domestic market is quiet, but there is some foreign inquiry, mostly from England. A Youngstown mill is reported to have sold 2000 to 2500 tons of grooved steel skelp for export. The domestic demand is dull, as the pipe mills are not running to more than about 35 per cent. of capacity. We quote: Grooved steel skelp, 1.10c. to 1.15c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.50c.; sheared iron skelp, 1.50c. to 1.60c., delivered to consumers' mills in the Pittsburgh district.

Nuts, Bolts and Rivets.—New demand is only for small lots for prompt shipment, and specifications against contracts are quiet. It is expected that consumers and makers will get together this month and place contracts for first half of 1915 delivery. The demand for rivets is dull. We quote structural rivets at 1.45c. and boiler rivets at 1.55c. in carload lots, small lots taking an advance of about 10c. Discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coach and lag screws	80 and 5% off
Small carriage bolts, cut threads	80% off
Small carriage bolts, rolled threads	80 and 5% off
Large carriage bolts	75 and 5% off
Small machine bolts, cut threads	80 and 5% off
Small machine bolts, rolled threads	80 and 10% off
Large machine bolts	75 and 10% off
Machine bolts, c.p.c. & t nuts, small	80% off
Machine bolts, c.p.c. & t nuts, large	75 and 5% off
Square h.p. nuts, blank and tapped	$6.30 off list
Hexagon nuts	$7.20 off list
C.P.C. and r sq. nuts, blank and tapped	$6.00 off list
Hexagon nuts, ⅝ in. and larger	$7.20 off list
Hexagon nuts, smaller than ½ in.	$7.80 off list
C.P. plain square nuts	$5.50 off list
C.P. plain hexagon nuts	$5.90 off list
Semi-fin. hex. nuts, ½ in. or under	85, 10 & 10% off
Semi-fin. hex. nuts, ⅝ in. and larger	85 & 5% off
Rivets, 7/16 x 6½, smaller & shorter	80, 10 & 5% off
Rivets, tin plated, packages	80, 10 and 5% off
Rivets, metallic tinned, packages	80, 10 and 5% off
Standard cap screws	70, 10 and 10% off
Standard set-screws	75, 10 and 10% off

Hoops and Bands.—Makers of hoops and bands are now entering orders for delivery through first quarter of next year on the basis of about 1.10c. for bands and 1.25c. for hoops, but on a very desirable specification about $1 a ton lower could be done. We quote steel bands at 1.10c. and steel hoops at 1.25c., f.o.b. Pittsburgh, for delivery through first quarter.

Merchant Steel.—Reports are that several large inquiries for cold-rolled strip steel and tool steels are being figured on by local mills, but details cannot be obtained. A local concern has shipped since the war broke out a considerable amount of high grade tool steels to England, France and Russia. The domestic demand is dull and only for small lots, and prices depend entirely on the order and deliveries wanted. Quotations on small lots for prompt shipment are about as follows: Iron finished tire, ½ x 1½ in. and larger, 1.30c., base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Standard Pipe.—Effective December 1, the National Tube Company, Pittsburgh, sent out new lists on oil-country goods, in which reductions were made from ½c. to 2c. per foot, but averaging less than 1c. per foot, or about $1 per ton, corresponding with the reduction in price of wrought steel pipe of $1 a ton, made on November 2. No change was made in discounts on wrought steel pipe, line pipe or boiler tubes. Shortly before the war broke out, the Dutch Shell Syndicate of Holland had an inquiry out for about 600 miles of 8-in. line pipe for the purpose of building an oil line from the Oklahoma oil fields to Port Arthur, Texas, from which point the oil is to be exported. When the war started, the project was dropped, but it has again been revived, and possibly this week the contract will be placed. Some small inquiries for line pipe are in the market. The new demand for wrought iron and steel pipe in November was less than in October, and no improvement is looked for this month, but it is believed that early in January there will be a material betterment. As a whole, iron and steel pipe mills are not running to more than about 35 per cent. of capacity. Discounts on iron and steel pipe are being held.

Boiler Tubes.—Some improvement is reported in demand for locomotive and merchant tubes, but conditions are still far from satisfactory. The demand for a long time has been very dull, with discounts more or less shaded.

Old Material.—In sympathy with other lines the feeling in the scrap trade is better, and it is believed that prices are at bottom. In fact some dealers will not sell at present prices, asking 50c. a ton or more advance, but have not been able to do business as yet at the higher figures. Stocks of scrap held by consumers are heavy, and it will take a good while to work these off. Dealers believe that sales to consumers will be dull this month, as it is near the inventory period, but look for a better demand early next month. No sales of moment were made during the week. For delivery to consumers' mills in the Pittsburgh and other consuming districts that take Pittsburgh freights dealers quote about as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$10.00
Compressed side and end sheet scrap	$9.00 to 9.25
No. 1 foundry cast	10.50 to 10.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	8.00 to 8.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock	10.00 to 10.25
Railroad grate bars	9.00 to 9.25
Low phosphorus melting stock	13.00
Iron car axles	18.75 to 19.25
Steel car axles	13.25 to 13.75
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	9.00 to 9.25
No. 2 busheling scrap	6.00 to 6.25
Machine shop turnings	7.25
Old carwheels	10.75 to 11.00
Cast-iron borings	7.75
*Sheet bar crop ends	10.50 to 10.75
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.75 to 11.00
Heavy steel axle turnings	8.25 to 8.50
Heavy breakable cast scrap	10.25 to 10.50

*Shipping point.

Coke.—In line with the recent activity in the pig-iron market coke is showing more life. Inquiries are in the market from Eastern and Valley furnaces for upward of 100,000 tons per month for first half. One contract for 4000 tons a month for January, February and March of low-sulphur furnace coke has been closed with an Eastern furnace company, and another consumer has bought 10,000 tons per month for all of 1915 on a sliding scale, based on the average monthly price of basic iron. A Valley furnace has contracted for 12,000 tons per month for first half at a flat price. Leading makers are asking $1.75 per net ton at oven for furnace coke for first half, but sales have been made at a slightly lower figure. There is not much activity in foundry coke, but prices are fairly strong. We quote standard makes of furnace coke for prompt shipment at $1.50 to $1.60 and on contracts for first half $1.65 to $1.75. High-grade 72-hr. foundry coke on contract is held at $2.15 and up to $2.50 per net ton at oven, two or three makes that have a very high reputation being held at the higher figure. The output of coke in the upper and lower Connellsville regions for the week ended November 21 is given by the Connellsville Courier as 200,804 net tons, a decrease from the previous week of 5510 tons.

Chicago

CHICAGO, ILL., December 2, 1914.—(*By Wire.*)

To the buying of pig iron the iron and steel market last week owed chiefly its appearance of improvement. In the past three or four days pig-iron melters have been closing for first-half contracts very freely and the movement now under way represents a very general providing for first-half requirements throughout this district. It is difficult to attribute this latest activity in the pig-iron market to anything more tangible than the crystallization of hopeful sentiment. Developments in connection with the marketing of finished iron and steel products are less clearly in the direction of better things. The booking of rails, shapes, plates and bars has been heavier, but the extremes to which local mills have gone in quoting prices to secure some of this business, more particularly tonnage for immediate shipment, have carried the market down to the lowest level of a long period. Through the sacrificing of freight advantages, delivered prices have been made which netted Western mills little, if any, better prices than have been obtained f.o.b. mill at Pittsburgh. While mill operations in December may benefit somewhat from such bookings, the outlook is hardly more clear than it has been. The market for scrap has taken on considerable activity, confined, however, to transactions among the dealers and brokers. With perhaps a single exception, current buying by the dealers appears to be in the interest of establishing higher prices rather than for the account of consumers.

Pig Iron.—The widespread inquiry for pig iron in this market, rather cautious and indifferent at first, has quickened into a very general buying movement in the past three or four days. A few of the larger interests have followed the lead of the American Radiator Company and taken individual tonnages of importance, but for the most part the buying has been done by the rank and file. While the purchases being made appear conservative as compared with normal requirements, the promptness with which the iron contracted for will be taken out is an evil sufficient unto its own day, the first-half melt being very much a closed book. But producers are not borrowing trouble, and contracting has run into a sufficient tonnage to bring about a withdrawal of the lowest prices that have been prevailing on local brands. A minimum of $13 at furnace is now being asked where business in the early part of the week was taken at $12.50 and $12.75. Quotations at $13 are being made with increasing reservations. The few sales of malleable and charcoal iron have been quite in the minority. There is some new inquiry for basic from St. Louis territory. Makers of Southern iron participated to a limited extent in the sales of the week at $9.75 and $10, Birmingham. Active merchant furnace capacity in this district has been still further reduced by the blowing out of Iroquois furnace C. Without the pressure to sell the make of this furnace, the market should be benefited accordingly, to which may be added the fact that the furnaces at Indiana Harbor have practically completed the disposal of their surplus tonnage for the time being. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal	$15.75 to $16.75
Northern coke foundry, No. 1	13.50 to 14.00
Northern coke foundry, No. 2	13.00 to 13.50
Northern coke foundry, No. 3	12.50 to 13.00
Southern coke, No. 1 f'dry and 1 soft.	14.25 to 14.50
Southern coke, No. 2 f'dry and 2 soft.	13.75 to 14.25
Malleable Bessemer	13.00 to 13.50
Standard Bessemer	15.50
Basic	12.50 to 13.00
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. sil'vy, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—The purchase of 12,000 tons of rails and 6500 tons of tie-plates by the Atchison, Topeka & Santa Fé Railroad has been given much prominence. This tonnage served at least to make a much better showing for the past week on the books of the leading interest than had been possible for some time previous. More encouraging reports regarding the financial ability of the larger roads centering here to buy equipment they need are being received, but aside from a very miscellaneous buying of small lots of rails there is no evidence that a programme for 1915 purchases is being considered. We quote standard railroad spikes at 1.45c. to 1.50c., base; track bolts with square nuts, 1.85c. to 1.90c., base, all in carload lots, Chicago; tie plates, $23.50 to $25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Tenders were received to-day for a bridge for the Keokuk & Hamilton Bridge Company, Keokuk, Iowa, requiring 3200 tons. The Decatur Bridge Company will fabricate 700 tons for the Orlando Hotel, Decatur, Ill., and also took another contract of approximately 300 tons. It is reported that the Clover Leaf System will buy 1800 steel underframes for cars and the Southern Pacific has just been authorized to spend $1,500,000 for new cars, a sum equivalent to the cost of about 1500. The dearth of railroad business, while it gives prominence to such minor transactions, also emphasizes how tremendously inadequate such orders are for relieving the situation. The keenness with which the mills have been pursuing the illusive order begins to be more apparent as the very low quotations that have been made come to light. Freight advantages have been freely sacrificed and 1.25c., Chicago, is considerably above the lowest prices that have been made. We quote for Chicago delivery of plain shapes 1.20c. to 1.289c.

We quote for Chicago delivery of shapes from store 1.75c.

Plates.—Some of the local mills are making a drive for prompt delivery business, and where specifications for tonnage of consequence can be had for December delivery prices are being made which establish a local market equivalent to 1c., Pittsburgh. Of such business there has been some tonnage placed. There is also a slightly better inquiry of a miscellaneous character. The Santa Fé is reported in the market for 100 tank cars. We quote for Chicago delivery of plates from mill, 1.189c. to 1.25c.

We quote for plates out of Chicago stock 1.75c.

Sheets.—Quotations for sheets delivered in Chicago territory show a situation that is far from being strong. On the basis of 1.90c. for No. 28 one-pass black sheets and 2.85c. for No. 28 galvanized at Pittsburgh, mills in adjacent territory are sacrificing some of their freight advantage in competing for the limited business available. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.539c.; No. 28 black, 2.089c.; No. 28 galvanized, 3.089c.

We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.55c.

Bars.—One important interest reports for the past few days the receipt of a round tonnage of steel-bar specifications in excess of any orders for three months. Attractive prices have also brought out a somewhat larger tonnage in other quarters. Such improvement as may be noted, however, has the disadvantage of being dependent apparently upon an artificial stimulus. Bar-iron sales are exceedingly small, and the worst that can be said of prices hardly goes beyond the facts. There is moderate inquiry for reinforcing bars. We quote for mill shipments as follows: Bar iron, 0.90c. to 1c.; soft steel bars, 1.189c. to 1.25c.; hard steel bars, 1.15c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 60 per cent. off.

Rivets and Bolts.—Buying of nuts and bolts is still dragging without material change in the situation. Very little interest is being shown in rivets. We continue to quote: Carriage bolts up to ⅞ x 6 in., rolled thread, 85; cut thread, 80-20; larger sizes, 80; machine bolts up to ¾ x 4 in., rolled thread, 85-5; cut thread, 85; larger sizes, 80-5; coach screws, 85-10; hot pressed nuts, square head, $6.60 off per cwt.; hexagon, $7.60 off per cwt. Structural rivets, ¾ to 1¼ in., 1.58c., base, Chicago, in carload lots; boiler rivets, 10c., additional.

We quote out of store: Structural rivets, 2.20c.; boiler rivets, 2.30c.; machine bolts up to ⅞ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅞ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square head, $6, and hexagon, $6.70 off per cwt.

Cast-Iron Pipe.—The award of the 25,000 tons for which prices were taken last week at Detroit has not yet been made. It would not be surprising if that city adhered to its usual practice of giving as much of the tonnage as possible to the Detroit shop of the American Car & Foundry Company. The only other municipal letting of consequence now in prospect is 150 tons at Neoga, Ill. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $23.50; 16 in. and up, $23, with $1 extra for gas pipe.

Old Material.—Scrap dealers are continuing their efforts to establish higher values for old material in this market, and in connection with this effort are paying considerably higher prices to the railroads. Transactions among themselves are likewise at advanced quotations. The consumers' situation has not changed, although it is generally understood that some of the dealers are now buying steel scrap for which it is expected the melter will pay about the same price as that at which the last purchase was made. It seems highly improbable that melters of scrap will be inclined to take on any additional tonnage at advanced prices, considering that new material is now selling at the lowest level thus far established. The railroad scrap listed for sale in this territory includes about 7500 tons from the Chicago & Northwestern, 2000 tons from the Pennsylvania Lines West, and a part of 15,000 tons offered by the Baltimore & Ohio. As a reflection of the higher prices which the railroads are securing for their scrap, and in the absence of buying by consumers, we have revised our quotations in a number of instances. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$11.00 to	$11.25
Old steel rails, rerolling	9.50 to	10.00
Old steel rails, less than 3 ft	9.25 to	9.50
Old carwheels	9.50 to	10.00
Heavy melting steel scrap	8.25 to	8.50
Frogs, switches and guards, cut apart	8.25 to	8.75
Shoveling steel	8.00 to	8.25
Steel axle turnings	6.50 to	7.00
	Per Net Ton	
Iron angles and splice bars	$10.25 to	$10.75
Iron arch bars and transoms	10.25 to	10.50
Steel angle bars	7.25 to	7.75
Iron car axles	13.75 to	14.00
Steel car axles	10.25 to	10.75
No. 1 railroad wrought	7.75 to	8.00
No. 2 railroad wrought	7.25 to	7.50
Cut forge	7.00 to	7.25
Steel knuckles and couplers	8.00 to	8.50
Steel springs	9.00 to	9.50
Locomotive tires, smooth	8.50 to	9.00
Machine shop turnings	4.75 to	5.00
Cast borings	4.50 to	4.75
No. 1 busheling	6.75 to	7.00
No. 2 busheling	5.75 to	6.00
No. 1 boilers, cut to sheets and rings	5.00 to	5.50
Boiler punchings	7.75 to	8.00
No. 1 cast scrap	8.50 to	8.75
Stove plate and light cast scrap	7.75 to	8.25
Grate bars	7.25 to	7.75
Railroad malleable	7.75 to	8.00
Agricultural malleable	7.25 to	7.50
Pipes and flues	5.75 to	6.00

Wire Products.—There is some demand for wire fencing for spring delivery, and the buying of wire nails shows an improvement over the preceding weeks. In general, purchases appear to be for the purpose of balancing stock rather than to meet an immediate consumptive demand. The prolonged period of mild weather, however, is in part responsible for a country trade more active than it would otherwise be. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.539; wire nails, $1.739; painted barb wire, $1.739; galvanized, $2.139; polished staples, $1.739; galvanized, $2.139, all Chicago.

Philadelphia

PHILADELPHIA, PA., December, 1, 1914.

Despite the desire of the trade to adhere to the idea that a better sentiment exists, many admissions are made that the more cheerful feeling which followed the recent election has not been supported by a sufficient volume of healthy business and a belief is growing that the optimism was too forced to be enduring. Export inquiry is on the increase, but where it has resulted in sales the prices have been too low for complete satisfaction. Barb wire continues to be sent abroad and figuring is being done on rails, billets and sheet bars for export. The domestic demand for bars, plates and shapes shows no improvement in tonnage, and prices for prompt lots have dropped in some instances below the basis of 1.10c., Pittsburgh. The mills are not inclined to load up with first-quarter business, but are taking on some at 1.30c., Philadelphia, and less at 1.25c. The sales of pig iron have been larger and more numerous, though melting has not increased, and the incentive to buy has been speculative in view of the low prices. A little more interest is shown in contract furnace coke.

Iron Ore.—No imports of iron ore are reported for the week ended November 28. In view of the shortage of vessels and the higher earnings which come from carrying other materials, it is likely that arrivals of iron ore will be curtailed from this time on. Of course, contracts for the transportation of ore from some points, Cuba and Chile for instance, will insure a supply from those countries. In the meantime there is practically no demand.

Pig Iron.—Fewer inquiries are before the trade than was the case a week or 10 days ago. Most of those previously referred to resulted in sales, but the business seems to have created little or no enthusiasm for the reason that prices were extremely low. Some of the dealers say they could not touch the low figures which were made. In the recent big buying of Buffalo iron which was quoted at $14.45, Philadelphia, not nearly as much was taken in this territory as in New York and New England, but enough was disposed of to make itself felt in a competitive way. It is pointed out that by the time the low price was withdrawn, or partially so, the Buffalo interests had supplied most of the demand. A Virginia producer who sold 1750 tons of iron last week and over 4500 tons in November finds that shipments are no heavier, but rather lighter, despite the larger sales and this is true of practically the entire trade. Consumers are not melting more, but are anticipating their needs of the future because of the low prices which prevail. Virginia iron is quoted at $15.25 for No. 2 X, but this price is understood to have been shaded. A few hundred tons of basic have been sold at near $13.50, delivered, the iron coming from the surplus stock of a steel mill. The trade has received an inquiry from an export agent for 35,000 tons of 2.80 per cent. silicon iron for shipment to England, but the inquiry is regarded lightly in view of the low price of pig iron in England and the abundant stocks on hand there. The general belief is that freight rates, both rail and ocean, preclude any business on the inquiry in question. The Pennsylvania Railroad has withdrawn an inquiry for 400 tons. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X foundry	$14.25 to $14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia No. 2 X foundry	15.25
Virginia No. 2 plain	15.00
Gray forge	13.50 to 13.75
Basic	13.50 to 14.00
Standard low phosphorus	20.00 to 21.00

Ferroalloys.—Local dealers continue to quote 80 per cent. ferromanganese at $68, seaboard, with various provisos made necessary by England's attitude in preventing free shipments. A sale at $62, Baltimore, reported from London by cable a week ago, was made as stated, but the low price made by the seller was due to a misunderstanding on his part of advices cabled from this side. Additional reports have come to light where quantities en route to this country have been held up at English ports, but whether the halt is due to government order or to a seamen's strike is not clear. Some importers have good-sized quantities afloat and they attribute their departure from England to the fact that they have made freight engagements months ago. Large consumers are well supplied for their present rate of operation, and it is understood that the Steel Corporation is willing to provide for some of the smaller ones. The quotation for 50 per cent. ferrosilicon remains at $71 to $73, Pittsburgh, depending on the quantity ordered. No arrivals at this port are reported for the week ended November 28.

Bars.—The demand for steel bars was lighter last week than in the previous week and prices are easier, though 1.25c., Philadelphia, continues the regular quotation. Bids are to be submitted today on 1500 tons for the Chesapeake & Ohio Railroad. Iron bars continue at about 1.12c., Philadelphia.

Plates.—A leading plate mill reports quiet conditions, to which the week has brought no change except additional requests for contracts at 1.25c., Philadelphia. Contracting is limited, however, and 1.30c., Philadelphia, is expected for first-quarter delivery. In some cases the 1.10c., Pittsburgh, base has been shaded for prompt delivery. Current business consists almost entirely of small miscellaneous lots, although some more or less tentative inquiry is coming from shipyards. One definite proposition before the trade concerns a Standard Oil tank boat which will require about 3000 tons of plates and 1500 tons of shapes.

Billets.—This product has been very dull so far as actual business goes, although the volume of inquiry from Europe for billets and sheet bars is considerably increased, amounting in the aggregate to several thousand tons. Duplications of the inquiries make it difficult to fix the exact tonnage. It is reported that the selling of billets for export means a price of $18.50, seaboard, and makers say they would lose money at this figure. For open-hearth rolling billets delivered here the quotation continues at $21.40. Forging steel is $4 higher.

Structural Material.—The situation is unchanged except that inquiries are even less in number and the market is correspondingly weak at 1.25c., Philadelphia.

Sheets.—Demand continues dull and makers are not assured of the future, although they are hoping that a buying movement of good proportion will come about the middle of January. The quotation for No. 10 blue annealed sheets is unchanged at 1.50c., Philadelphia.

Coke.—Business is not much improved though inquiries have been made for contract furnace coke, and one sale of about 20,000 tons at not less than $1.75 is reported. In prompt furnace coke there is slightly more activity also. Foundry coke shows but little life. The quotation for prompt furnace is about $1.60 per net ton at oven, and for contract furnace, $1.65 to $1.75. Prompt foundry is weaker at $2 to $2.25 per net ton at oven, with contract unchanged at $2.35 to $2.50. Freight rates to this city from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market does not show much change beyond a little more strength here and there, but scarcely enough to warrant any advance in prices. Some of the recent surplus stock in this market of heavy melting steel has been absorbed, which is a cause of encouragement. The Joseph Joseph & Brothers Company is understood to have bought the 7000 tons of old material which recently arrived here from the Isthmus of Panama. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$9.25 to $9.50
Old steel rails, rerolling	11.50 to 12.00
Low phosphorus heavy melting steel scrap	13.50 to 14.00
Old steel axles	13.00 to 13.50
Old iron axles	17.50 to 18.00
Old iron rails	13.00 to 14.00
Old carwheels	9.50 to 10.00
No. 1 railroad wrought	11.50 to 12.00
Wrought-iron pipe	9.50 to 10.00
No. 1 forge fire	8.00 to 8.50
Bundled sheets	8.00 to 8.50
No. 2 busheling	7.75 to 8.25
Machine shop turnings	7.50 to 8.00
Cast borings	7.50 to 8.00
No. 1 cast	11.00 to 12.00
Grate bars, railroad	8.00 to 8.50
Stove plate	8.00 to 8.50
Railroad malleable	9.00 to 9.50

Cleveland

CLEVELAND, OHIO, December 1, 1914.

Pig Iron.—A fairly active buying movement is under way in the northern Ohio territory and adjoining districts. Considerable tonnage of Northern foundry iron and some malleable iron was sold during the week for delivery in the first half. Southern iron has also been very active. A good volume of inquiries is still coming out and indications are that the buying movement will continue. Sales for the most part have been to the smaller consumers in lots of 1000 tons and under. The manufacturers of heating equipment and agricultural implements have been buying quite freely. Some of the largest consumers of foundry iron are now in the market. The present movement appears to have been stimulated by the heavy buying in the Buffalo district and the advance in price there that followed. Consumers feel that prices are way down at present and that they cannot lose by purchasing at present quotations. Considering present foundry conditions some of the buying is of a speculative character, consumers taking on more tonnage than they will probably need for the first half. However, most buyers appear to be limiting their purchases to their expected requirements. While furnace men are talking of better prices, no efforts are being made so far to get an advance. Considerable business has been taken at $12.50, Valley furnace, for No. 2 foundry and at the same price, Cleveland, for outside shipment and for near-by delivery local furnaces have been able to get as high as $13 in some cases. A uniform selling price of $13 at furnaces for No. 2 is being maintained by local furnaces for local delivery. A large tonnage of Southern foundry iron was sold during the week by Ohio agencies at $9.75, Birmingham, for No. 2 for the first half. This price concession appeared the latter part of the week and after taking on considerable business at that price some producers put their price back to $10. Among the larger sales reported are purchases of 4000 tons by a Cleveland stove maker, 1000 tons by an Akron furnace builder and 1000 tons by a Northern Central Ohio sanitary interest. The leading pipe interest is understood to be figuring on the purchase of considerable iron and a northern Ohio pipe foundry has an inquiry out for 6000 tons including 3000 tons of No. 3, 1500 tons of No. 4, and 1500 tons of gray forge. The leading sanitary interest is inquiring for part of its requirements for the first half, the tonnage wanted not being stated. An inquiry from an implement maker in Mansfield, Ohio, is for 1200 tons. Steel-making iron continues quiet. As a result of the increased demand for iron, M. A. Hanna & Co. will blow in their Cherry Valley furnace at Leetonia, Ohio, to-day or to-morrow. We quote, delivered Cleveland, as follows:

Bessemer	$14.70
Basic	13.45
Northern No. 2 foundry	13.25
Southern No. 2 foundry	$13.75 to 14.00
Gray forge	13.00
Jackson Co. silvery, 8 per cent. silicon	17.62
Standard low phos., Valley furnace	20.00

Iron Ore.—The last ore for the season was shipped from Escanaba Monday and the month's shipments were larger than expected, bringing the total season's shipments by water up to 32,022,000 tons. The November movement was 1,071,195 tons. We quote prices as follows: Old Range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Coke.—The demand for furnace coke for spot shipment has improved. One sale of 5000 tons is reported for December delivery. Some inquiry for contracts is pending on which $1.75 has been quoted for the first quarter. We quote standard furnace coke for prompt shipment at $1.50 to $1.60 per net ton at oven and the best grades of foundry coke at $2.25 to $2.35.

Finished Iron and Steel.—With the prevailing low prices consumers feel that it is a good time to buy for future requirements and considerable business is being booked for the first quarter delivery in steel bars, plates and structural material and considerable inquiry for contracts is pending. Most of the mills are declining to make contracts beyond April 1, but a limited amount of business has been taken for delivery through the first half. First-quarter contracts are being made at 1.10c. to 1.15c. for steel bars, plates and structural material, most of these being at the lower price, and 1.05c. can probably be done on a desirable contract for plates. Some improvement is noted in the demand both in current orders and in specifications on contracts. For current business 1.05c. can still be done for steel bars, plates and structural material, for desirable orders, and plate business is reported to have been taken at a price that figures back slightly lower than 1.05c., Pittsburgh. The iron bar market continues weak, the usual quotations for Cleveland delivery being 1.05c. to 1.10c. Hard steel bars have sold down to 1c. for several 100-ton lots for a Cleveland building. The T. H. Brooks Company, Cleveland, has taken the Lindner building which will require 1200 tons, the McClintic-Marshall Construction Company has taken the building for the passenger boat docks in Cleveland requiring 400 tons, and the King Bridge Company has taken 450 tons for a Lake Shore bridge in Elyria, Ohio. Government crane work taken by the McMyler-Interstate Company will require 600 to 700 tons. Some sheet contracts for the first quarter are being placed at 1.90c. for No. 28 black; 2.85c. for No. 28 galvanized, and 1.40c. for No. 10 blue annealed. These are the prevailing spot prices except for blue annealed sheets which are quoted at 1.35c. for prompt shipment. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—Demand for bolts and nuts has improved considerably and there is a fair volume of inquiry for first quarter contracts, but makers are not yet quoting prices for future delivery. Some rivet contracts are being placed for the first quarter. For attractive business the current carload prices of 1.45c. for structural and 1.55c. for boiler can be secured for the first quarter. Discounts are as follows: Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 75 and 15 per cent.; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 80 and 25 per cent.; cut thread, 80 and 20 per cent.; larger or longer, 80 per cent.; coach and lag screws, 80 and 25 per cent.; square h.p. nuts, blank or tapped, $6.30 off; hexagon h.p. nuts, blank or tapped, $7.20 off; c. p. c. and t. square nuts, blank or tapped, $6 off; hexagon, ⅝ in. and larger, $7.20 off; 9/16 in. and smaller, $7.80 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 5 per cent.

Old Material.—The scrap market shows an improvement. A fair volume of inquiries for heavy steel scrap has developed in the Mahoning Valley and quite a few sales have been made. The better demand and the improved sentiment has resulted in an advance of 50c. a ton to $10.50 on the price of heavy steel for delivery to Valley mills. The local market continues quiet, but heavy steel scrap and railroad malleable advanced 25c. a ton. Other prices are unchanged, but the market is firmer. The Baltimore & Ohio Railroad will close on a heavy tonnage of scrap next week. Other lists out which will be closed this week include the New York Central, Pennsylvania lines and Pennsylvania Railroad. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.00 to $11.75
Old iron rails	12.00
Steel car axles	11.75 to 12.00
Heavy melting steel	9.00 to 9.50
Old carwheels	10.00 to 10.50
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	8.00 to 8.50
Railroad malleable	9.25 to 9.50
Light bundled sheet scrap	7.50 to 8.00

Per Net Ton

Iron car axles	$16.75 to $17.00
Cast borings	5.50 to 5.75
Iron and steel turnings and drillings	5.00 to 5.25
Steel axle turnings	6.00 to 6.25
No. 1 busheling, new	8.00 to 8.25
No. 1 busheling, old	7.75 to 8.00
No. 1 railroad wrought	9.00 to 9.50
No. 1 cast	9.25 to 9.75
Stove plate	7.50

Buffalo

BUFFALO, N. Y., December 1, 1914.

Pig Iron.—It is becoming more difficult to purchase any grade of pig iron in the Buffalo district for first quarter delivery at less than $13 at furnace, and tenders of $12.50 and slightly under from users for 1000-ton lots have been refused by some producers. The advance in prices has checked buying appreciably and the total of new orders for the week was not over 12,000 tons of all grades. Shipments on contracts are going out in full volume, and it is noted that in some instances specification is urgent. We quote below for first quarter 1915 delivery, f.o.b. furnace:

No. 1 foundry	$13.25 to $13.50
No. 2 X foundry	13.00 to 13.25
No. 2 plain	12.75
No. 3 foundry	12.50 to 12.75
Gray forge	12.50 to 12.75
Malleable	13.00 to 13.25
Basic	13.25 to 13.75
Charcoal, regular grades and analysis	16.25 to 17.25
Charcoal, special grades and analysis	20.50

Finished Iron and Steel.—Most of the selling agencies report noticeable improvement in specification and some moderate sized inquiries for steel bars and bar material, and a small amount of structural. Only a small proportion has as yet resulted in orders. There is a growing optimistic sentiment among sellers that demand will increase with the beginning of the new year. The Progressive Structural Steel Company, Buffalo, has taken 100 tons for the Norwich Chemical Company at Smethport, Pa., and R. T. Ford & Co., Rochester, have 250 tons for the Iola Sanitarium addition in that city.

Old Material.—The Erie Railroad has sold scrap metal estimated at about 40,000 gross tons from its reclamation yard at Buffalo to a syndicate of New York and Pittsburgh dealers. This scrap, which consists of wrought, cast iron and steel, old car wheels, axles, etc., is an accumulation of about three years. The market shows more activity than noted last week. Dealers are still reluctant to sell at prices offered by users. Prices are not quotably changed from last week, although as stated in the last report dealers are inclined to hold for a higher scale of prices. We quote per gross ton, f.o.b. Buffalo:

Heavy melting steel	$9.00 to $9.50
Low phosphorus steel	12.50 to 13.00
No. 1 railroad wrought scrap	9.00 to 9.50
No. 1 railroad and machinery cast	9.75 to 10.25
Old steel axles	11.00 to 11.50
Old iron axles	16.00 to 16.50
Old carwheels	10.00 to 10.50
Railroad malleable	8.50 to 9.00
Machine shop turnings	5.00 to 5.50
Heavy axles turnings	7.50 to 8.00
Clean cast borings	5.25 to 5.75
Old iron rails	10.50 to 11.00
Locomotive grate bars	8.00 to 8.50
Stove plate (net ton)	8.00 to 8.50
Wrought pipe	6.50 to 7.00
Bundled sheet scrap	5.75 to 6.25
No. 1 busheling scrap	7.00 to 7.50
No. 2 busheling scrap	5.00 to 5.25
Bundled tin scrap	10.00

Cincinnati

CINCINNATI, OHIO, December 2, 1914.—(*By Wire.*)

Pig Iron.—From a tonnage standpoint the foundry-iron situation is very satisfactory. While there were numerous inquiries before the trade at the beginning of last week, it was not thought that so many would develop into actual orders. Prices on both Southern and Northern iron have suffered from the keen competition and quite a number of orders were booked 25c. a ton lower than previous quotations, and it is also reported that several contracts were signed at the reduced figures, with deliveries extended up to July 1. While the majority of Southern producers are holding out for $10 at furnace, considerable No. 2 foundry is yet available at $9.75, Birmingham, for nearby shipment. The nominal quotation on Northern iron is $12.75 to $13, Ironton. In addition to a large increase in small orders booked last week, several sales are reported in this territory ranging all the way from 500 to 2000 tons, most of which are for first half. Considerably more Southern than Northern iron was placed. Several inquiries previously reported have been carried over into the present week, included in which is a local one for 1500 tons of both Northern and Southern grades. An Indiana melter wants 300 tons to be divided between the two producing districts mentioned. Among the inquiries from Michigan is one for 1000 tons of Southern iron. A leading manufacturer of sanitary supplies is said to be on the verge of closing for a round tonnage of iron for first half. Malleable is wakening up, 1000 tons having been sold to a Central Western melter, and there is an inquiry for a like tonnage from central Ohio. Basic continues quiet. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$13.15 to $13.65
Southern coke, No. 2 f'dry and 2 soft	12.65 to 13.15
Southern coke, No. 3 foundry	12.15 to 12.65
Southern No. 4 foundry	11.65 to 12.15
Southern gray forge	11.15 to 11.65
Ohio silvery, 8 per cent. silicon	17.20 to 17.70
Southern Ohio coke, No. 1	15.01 to 15.51
Southern Ohio coke, No. 2	14.01 to 14.51
Southern Ohio coke, No. 3	13.76 to 14.01
Southern Ohio malleable Bessemer	14.26
Basic, Northern	14.51 to 15.01
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—In the Ironton district two contracts for furnace coke have been closed that called for a total of 135,000 tons, to be shipped next year, and it is reported that more business is in sight. Several Southern furnaces will also doubtless provide for future requirements. The consumption of foundry coke continues on the increase, but contracting for the future is limited. We quote Connellsville furnace coke at $1.60 to $1.70 per net ton at oven, with foundry grades obtainable from $2 to $2.25. Pocahontas and Wise County producers are still asking 10c. to 20c. a ton above these figures.

Finished Material.—Jobbers who generally contract for a supply of machine screws, bolts, etc., at this season are now unable to place orders beyond April 1. In fact, it is hard to make contracts for any class of finished material at present prices, where deliveries are wanted to extend into next year. The sheet situation continues to show improvement, and orders for spot shipment are on the increase. Quotations are firmer at 2.058c. on No. 28 black sheets, and 3.058c. on No. 28 galvanized, f.o.b. Cincinnati, or Newport, Ky. The local store price of steel bars and small structural shapes is unchanged at 1.80c. on less than carload lots. Hoops and bands are quiet.

Old Material.—Several dealers report an improvement in the sentiment, but the stocks on hand in yards, coupled with the comparatively large tonnages offered by the railroads, preclude any possibility of an early advance in prices. The consumption of scrap by the foundries has greatly increased lately, but the rolling mills are only using about the average quantity. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, Southern Ohio and Cincinnati, and the maximum figures are dealers' prices, f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.00 to $6.50
Old iron rails	10.75 to 11.75
Relaying rails, 50 lb and up	19.50 to 20.00
Rerolling steel rails	9.50 to 10.00
Melting steel rails	8.50 to 9.00
Heavy melting steel scrap	8.25 to 8.75

Per Net Ton

No. 1 railroad wrought	$7.25 to $7.75
Cast borings	3.75 to 4.25
Steel turnings	3.75 to 4.25
Railroad cast scrap	9.00 to 9.50
No. 1 machinery cast scrap	9.50 to 10.00
Burnt scrap	5.75 to 6.25
Old iron axles	13.25 to 13.75
Locomotive tires (smooth inside)	8.50 to 9.00
Pipes and flues	5.25 to 5.75
Malleable and steel scrap	6.50 to 7.00
Railroad tank and sheet scrap	4.25 to 4.75

The McMyler-Interstate Company, Bedford, Ohio, has taken an order from the United States Government for nine 10-ton cranes for the Navy Department. Five of these will be erected at the yard at Boston and four at Philadelphia.

St. Louis

ST. LOUIS, MO., November 30, 1914.

Pig Iron.—Sales have been made, mostly for the first quarter, with a few for the first half, aggregating probably 18,000 tons. There are a number of inquiries still pending, including one for 1200 and one for 1000 tons, both from stove-making concerns, one for 1000 tons of malleable, one for 2000 tons of Northern basic and one for 500 tons and one for 200 tons of Southern No. 2 foundry. While there is reported weakness of price, a number of offers from prospective purchasers at lower prices have been reported as turned down by the furnaces.

Coke.—The movement continues fairly satisfactory on contracts. By-product coke is as usual a shade below the competitive Connellsville price, with $2.80 added for freight.

Finished Iron and Steel.—In warehouse business there has been continued improvement. Quotations for stock from warehouse are: Soft steel bars, 1.70c.; iron bars, 1.65c.; structural material, 1.80c.; tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, 2.55c.; No. 28 galvanized, black sheet gauge, 3.55c. In the contracting market there is some slight increase in buying, but no disposition to cover for large quantities.

Old Material.—There has been an improvement in demand for both steel and rolling mill grades. Otherwise there are no noteworthy changes. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton

Old iron rails	$10.00 to $10.25
Old steel rails, rerolling	9.50 to 10.00
Old steel rails, less than 3 ft.	9.00 to 9.50
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.00 to 10.25
No. 1 railroad heavy melting steel scrap	8.25 to 8.50
Shoveling steel	7.50 to 8.00
Frogs, switches and guards cut apart	8.25 to 8.50
Bundled sheet scrap	4.25 to 4.50

Per Net Ton

Iron angle bars	$9.50 to $10.00
Steel angle bars	8.00 to 8.25
Iron car axles	15.00 to 15.25
Steel car axles	10.00 to 10.25
Wrought arch bars and transoms	10.00 to 10.25
No. 1 railroad wrought	7.25 to 7.50
No. 2 railroad wrought	7.00 to 7.25
Railroad springs	7.50 to 7.75
Steel couplers and knuckles	7.75 to 8.00
Locomotive tires, 42 in. and over, smooth	8.25 to 8.75
No. 1 dealers' forge	7.00 to 7.25
Mixed borings	3.50 to 3.75
No. 1 busheling	6.75 to 7.00
No. 1 boilers, cut to sheets and rings	5.25 to 5.75
No. 1 railroad cast scrap	8.50 to 9.00
Stove plate and light cast scrap	7.00 to 7.25
Railroad malleable	6.50 to 6.75
Agricultural malleable	6.00 to 6.25
Pipes and flues	5.00 to 5.50
Railroad sheet and tank scrap	5.00 to 5.25
Railroad grate bars	6.25 to 6.50
Machine shop turnings	4.25 to 4.50

Birmingham

BIRMINGHAM, ALA., November 30, 1914.

Pig Iron.—While the price basis for Southern pig iron is still unsettled on forward deliveries, the general belief is that $10, Birmingham, will apply for the first half for any considerable tonnage. In addition to that, it is believed that a slight shading, say not over 25c. per ton, has been made for December delivery where the order was large and overlapped into 1915. Undoubtedly sales have been on a more generous scale than since the beginning of the European war. One dealer sold a lot of 1500 tons and another of 300 tons for Southern delivery. A sale involving a considerable tonnage for Southern delivery, covering the next few months, was made on a $10 basis. Quite a lot of basic appears to have been sold. Inquiries are more numerous than they have been in some time. However, some of those inquiring propose shadings which the operators here are not inclined to make. It is expected that a large tonnage will be bought by Southern pipe interests in the immediate future. The general disposition of foundrymen is to cover for the first quarter to first half of 1915 at present levels under the expectation that prices for second-half iron will be higher. The situation is a mixed one, but there seems to be more room for real optimism than has existed for some time. Efforts to fix an advance for the second quarter appear to have failed. It is generally believed that a genuine buying movement has set in and large sales are expected any day. Business that has been going is reported as having been shared by nearly all the manufacturers. We quote, per gross ton, f.o.b. Birmingham (the higher figures being for small lots for 1915 delivery), as follows:

No. 1 foundry and soft	$10.50 to $10.75
No. 2 foundry and soft	10.00 to 10.25
No. 3 foundry	9.50 to 9.75
No. 4 foundry	9.25 to 9.50
Gray forge	9.00 to 9.25
Basic	10.00 to 10.25
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—The National Pipe Company, North Birmingham, is said to be well provided with work for the remainder of the year. A Western contract involving about 300 tons was booked by a local concern the past week. While prices are still shaded on attractive specifications, quotations, per net ton, f.o.b. pipe shop yards, are still as follows: 4-in., $20; 6-in. and upward, $18, with $1 added for gas pipe.

Coal and Coke.—The coal situation has not improved. A 50 per cent. output is the best with most of the collieries and some are not doing that. Additional inquiries are noted for both coke and pig iron from the Pacific coast, following the institution of the Mobile-San Francisco steamship line and what appears to be a general renewal of interest in the Birmingham district on the part of that coast. Western agents and dealers have been in Birmingham sounding the market. Coke is being disposed of without price change. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $2.90; foundry, $3 to $3.25, with as high as $3.50 for the very best grade, which is in limited supply.

Old Material.—Steel scrap has been in some demand, but there has been no recovery in the general scrap market and prices quoted are dependent upon individual transactions. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.00 to 12.50
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.00 to 7.50
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	8.50 to 9.00
Stove plate	8.00 to 8.50

San Francisco

SAN FRANCISCO, CAL., November 24, 1914.

A more confident feeling prevails as to the future, and a slight improvement is noted in financial conditions. Current business, however, is confined to the same narrow limits as for some time, and there is no prospect of a greater consuming demand until after the holidays. The paucity of stock in both merchants' and manufacturers' hands will necessitate a somewhat larger movement by that time; and the general expectation of increasing requirements, with the fact that present prices are unusually attractive to buyers, is at least favorable for a fair buying movement.

Bars.—Orders for shipment from the mills are scarce, business being principally from store. Orders for reinforcing bars continue small and scattering. Local mills are curtailing their output as closely as possible without shutting down and show some anxiety for business. Prices show considerable variation.

Structural Material.—The Ralston Iron Works has taken a waterfront building contract requiring 133 tons. Otherwise current fabricating business is of an insignificant nature, and new inquiries are slow to appear. Figures will be taken December 7 for eight 65-ft. steel bridges for the Dalles-Celilo Canal in Oregon. The Potrero municipal car barn, from which some business was expected, will require no fabricated material, and several other prospective jobs have been delayed. Local fabricators are getting most of their plain material from store, as required.

Plates.—There is little demand for tank material, but the tonnage for shipbuilding and boiler work is holding up fairly well, especially in the north, where marine repair work is active. The business is made up of small orders, as consumers are keeping close to current needs.

Sheets.—The jobbing trade in corrugated sheets shows a seasonable curtailment, though not actually dull. Merchants' specifications are extremely small. So far there has been very little booking for first quarter delivery, though apparently more attention is being given to future requirements. Figures are being taken on five miles of 12-in. pipe for the Exposition and it is expected that light riveted material will be used.

Standard Pipe.—The November tonnage is running somewhat ahead of the previous month, and general reports offer slightly more encouragement. There has been no important business, nor is any immediately in sight; but merchants are buying a little more freely, and a few small oil field inquiries have appeared.

Cast-Iron Pipe.—San Diego is taking figures for a small lot of pipe. Otherwise inquiries are small and scattering, but sufficiently numerous to give some encouragement. The opening of traffic with Southern ports via Panama has brought out some orders from jobbers, but the buying has so far been of a limited nature. Prices are quoted at $31 per net ton for 4-in.; $29 for 6-in. and up, and $1 extra for gas pipe.

Pig Iron.—The market is in very poor shape, as the requirements of both foundries and steel plants continue extremely light, and there is quite a large tonnage of foreign iron in both importers' and melters' hands, which has been materially increased in the last fortnight. While nothing further is expected from Europe in the near future, some Calcutta iron continues to arrive, and the prospect of further competition from Hanyang in China has a disturbing effect. The most important feature, however, is the offering of Southern iron, which at the present Birmingham basis can be landed by the Panama route in effective competition with any foreign material of similar grade. So far comparatively few sales have been made, but an extensive business in Southern iron is expected as foundry conditions improve. Local prices for delivery from store are too irregular for any definite quotations.

Coke.—Six sailing vessels arriving last week brought an aggregate of about 11,000 tons of German Syndicate coke. This is believed to be the last material from that source that can be received for an indefinite period, but it will be ample for local needs for many months, and meanwhile little interest is taken in offerings from other quarters. The larger foundries, as well as dealers, are well stocked. Dealers, however, are holding the price fairly well up to $15 per gross ton, delivered to local foundries.

Old Material.—While current requirements are closely restricted, quite a large tonnage of steel melting scrap has recently changed hands at private terms. Values can be quoted only approximately, at the wide range of $5 to $8 per gross ton. Quotations for cast-iron scrap also show considerable variation, $14 per net ton being about the inside figure, while as high as $16 might be secured for desirable offerings. The movement is light and in small lots. Wrought-iron scrap remains very dull.

Boston

BOSTON, MASS., December 1, 1914.

Old Material.—Producers of scrap and the small collectors are holding their accumulations more carefully in the belief that better prices are on the way. Otherwise, the market has not changed. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	$7.00 to	$7.75
Low phosphorus steel	13.75 to	14.75
Old steel axles	12.75 to	13.25
Old iron axles	20.25 to	20.75
Mixed shafting	12.00 to	12.25
No. 1 wrought and soft steel	8.25 to	8.75
Skeleton (bundled)	5.50 to	5.75
Wrought-iron pipe	7.00 to	7.50
Cotton ties (bundled)	5.25 to	5.75
No. 2 light	3.25 to	3.75
Wrought turnings	5.00 to	5.50
Cast borings	5.00 to	5.25
Machinery cast	10.75 to	11.00
Malleable	7.50 to	7.75
Stove plate	7.00 to	7.50
Grate bars	5.25 to	5.50

New York

NEW YORK, December 2, 1914.

Pig Iron.—The advance in prices by Buffalo sellers is one reason for the lessened activity in pig iron in the metropolitan and New England districts. Two Buffalo companies are asking $13 for No. 2 X at furnace and some business has been done at that figure, while lower silicon irons in a few cases have brought $12.75 for the first quarter. Some quotations of $12 which were out last week were not withdrawn at once and there are also reports of $12.25 and $12.50 quotations on iron for shipment in the first three months of 1915. The leading electrical interest in the East was in the market for several thousand tons, but it is not definitely known whether this inquiry has been closed. Malleable foundries of the East, which bought considerable iron some months ago, participated sparingly, if at all, in the Buffalo movement. In a few cases local offices have had requests for the shipment in December of some of the iron bought for early next year. Reported inquiry for pig iron for a pipe foundry has stirred up a good deal of interest in the trade, particularly among eastern Pennsylvania furnaces. Inquiry for basic is reported from one Eastern melter. Rather more interest has been taken in Virginia iron in this district and sellers are now generally quoting $12.50 at furnace for No. 2 X. Little is heard of Alabama iron, the consumption of which in New York territory is practically limited to two foundries. It is not known to what extent important Eastern foundry companies participated in the buying of Buffalo iron, but it is rather significant that on the announcement of the $1 advance inquiry as well as sales fell off, indicating that some buyers at least are giving no signs of any belief that they have overstayed their market.

Ferroalloys.—The situation regarding arrangements to ship ferromanganese from England is unchanged. Representatives of English makers here say that they have been unable to secure the release of any and are not making any deliveries on contract. One report is that the British Government has proposed to the authorities at Washington to allow ferromanganese to be shipped to this country on condition that the United States agrees to prevent war materials of any kind being shipped from this country to England's enemies—certainly a very large contract. The belief prevails that in time some plan will be formulated by which the alloy can be sent here. In the meantime business is practically stopped. Inquiries aggregate 400 to 500 tons. The market is quoted nominally at $68, seaboard, for future delivery and some contracts are being negotiated for the first half of next year at this figure, conditioned on ability to secure the alloy. It is likely that some spot material is obtainable at about $75, seaboard. The Carnegie Steel Company, it is understood, will sell ferromanganese at $65, seaboard. Ferrosilicon, 50 per cent., is unchanged at $71 to $73, Pittsburgh, and on inquiry for next year the same quotations apply.

Finished Iron and Steel.—November proved slightly better than October in volume of business, if the price did not average quite so high. Fabricated work has not improved and there is not a very great volume held up awaiting the release of money to finance it, but prospects in car building are better, both in inquiry and in financial favor toward railroad buying. Rumors there are of lower than 1.10c., Pittsburgh, for plain material, but mills are holding out strongly for a minimum of

1.10c. The largest structural letting involves 2000 tons for an expansion of the Remington Arms plant at Ilion, N. Y., awarded to the Lackawanna Bridge Company; and other contracts of the week include 800 tons for the Seth Milliken warehouse, New York, awarded to the Hay Foundry & Iron Works; 200 tons for a high school, Washington to Dietrich Brothers; 150 tons for the Cincinnati, Hamilton & Dayton, to the Mt. Vernon Bridge Company; 250 tons for a town hall, West New York, N. J., to the Selbach-Meyer Company; 390 tons for a pier shed for the D. & C. Navigation Company, to the McClintic-Marshall Company, and 200 tons for the Boston & Albany, at Boston, said to be awarded to the American Bridge Company, which is operating in the East at 85 per cent. capacity. The Lindner store, Cleveland, 1200 tons, partly Bethlehem shapes, has been closed with T. H. Brooks & Co. In railroad cars the Northern Pacific has placed 74 passenger cars with the Pullman Company in addition to the 21 sleepers recently noted, and the Atchison, it appears, bought 100 tank cars from the Pressed Steel Car Company about four weeks ago. It is stated that the Long Island Railroad has effected financial arrangements to buy 97 passenger equipment cars. The Union Tank Line is in the market for 500 tank cars. The Standard Oil Company is to build a 500-ft. tank steamer, taking 2000 tons of plates and 1000 tons of shapes, probably at the Newport News shipbuilding plant or at the Maryland Steel Company's plant. The Lehigh Valley is in the market for a pier-shed requiring 800 tons of structural steel and bridge work totaling 700 tons. We quote mill shipments of steel bars, shapes and plates at 1.10c. to 1.15c., Pittsburgh, or 1.26c. to 1.31c., New York, and iron bars at 1.20c. to 1.25c., New York. For lots from store we quote iron and steel bars at 1.80c. to 1.85c., New York, and plate and structural material at 1.85c. to 1.90c.

Cast-Iron Pipe.—New lettings announced for the near future are Lawrence, Mass., which will open bids December 5 on 200 tons of 4 to 8 in. and Pawtucket, R. I., December 15, on 500 tons of 4 and 6 in. The Warren Foundry & Machine Company is low bidder on the 25,000 tons for Detroit, Mich., on which bids were opened November 24. This company's prices were $21 per net ton, delivered, on 48, 42 and 36 in.; $22 on 24 in.; $23 on 16 in. and $24 on 8 and 6 in. The American Car & Foundry Company, which has a pipe foundry in Detroit, named $21.95 on all sizes, and the United States Cast Iron Pipe & Foundry Company named $22 for the sizes from 48 to 16 in. and $22.25 for the 8 and 6 in. The Warren Foundry & Machine Company's bid averaged lower than any of the others because the large sizes constituted the bulk of the tonnage. An award has not yet been made. On the contract for 1550 tons of 30 to 4 in., on which bids were opened by Lynn, Mass., November 26, the United States Cast Iron Pipe & Foundry Company is understood to be low bidder at $19.13 per net ton, delivered. It is stated that the Colorado Fuel & Iron Company has received a contract for 390 tons of 20 in. and 519 tons of 24 in. for the city of Pueblo, Colo., at $28. Springfield, Ohio, is reported to have bought 300 tons of 6 in. from the Lynchburg Foundry Company at $21.30, delivered. It is also announced that Winnipeg, Canada, has bought about 400 tons of 14 and 12 in. from the Canadian Iron Corporation at $35.80, delivered. In addition to the municipal lettings, which are becoming more numerous, it is understood that private buying is fairly active, with good tonnages involved. It is quite confidently expected that at the rate at which pipe business is now coming out prices must soon stiffen. Meanwhile, carload lots of 6 in. are still quoted at $20 to $20.50 per net ton, tidewater.

Old Material.—Confidence continues to strengthen among dealers, despite the lack of any considerable volume of new business. Foundry grades of old material are showing a little more life, but as far as can be ascertained nothing is being done in steel scrap or rolling-mill stock. Dealers are receiving a little more cheerful information from steel manufacturers with regard to possibilities of better trade and base their hopes on some revival of business in that direction. Quotations are unchanged as follows, per gross ton, New York:

Old girder and T rails for melting	$7.00 to	$7.25
Heavy melting steel scrap	7.00 to	7.25
Relaying rails	19.00 to	19.50
Rerolling rails	8.00 to	8.25
Iron car axles	14.00 to	14.25
Steel car axles	10.00 to	10.50
No. 1 railroad wrought	8.50 to	9.00
Wrought-iron track scrap	8.00 to	8.50
No. 1 yard wrought, long	8.00 to	8.50
No. 1 yard wrought, short	7.00 to	7.25
Light iron	3.00 to	3.50
Cast borings	5.50 to	6.00
Wrought turnings	5.00 to	5.50
Wrought pipe	7.00 to	7.25
Carwheels	8.50 to	9.00
No. 1 heavy cast, broken up	9.50 to	10.00
Stove plate	7.25 to	7.50
Locomotive grate bars	6.00 to	6.50
Malleable cast	6.50 to	7.00

Improved British Steel Trade

Absence of Continental Competition Now Felt—British Consumers Buying

(By Cable)

LONDON, ENGLAND, December 2, 1914.

Improvement in pig iron is maintained. Increased confidence is being felt, owing to the war position, big demands for steel and scarcity of labor. Home consumers are buying quite freely. A decidedly better tone is evident in merchant steel, and British makers are beginning to feel the absence of German and Belgian material. Some buying is being done for January to June. Works are well placed for orders but labor is very short. Energies are largely concentrated on national requirements, but the big demand for tramp steamers is having a good effect on ordinary ship plates, angles, etc. Few rail orders are coming out. About 6000 tons for Tasmania has been booked at £6 2s. 6d. ($29.80) f.o.b. ship. Tin plates are easy, export prohibitions causing resales. Markets generally are benefiting from the absence of Continental competition. Stocks of pig iron in Connal's stores are now 106,514 tons, against 103,776 tons last week. Furnaces in blast in the three districts are 167, against 178 at same time last year. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 6d. ($3.04), against 12s. 7½d. ($3.07) last week.

Cleveland pig-iron warrants (Tuesday), 52s. ($12.66), against 51s. 1½d. ($12.44) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 52s. 6d. ($12.78), against 51s. 9d. ($12.59) last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £8 10s. ($41.36).

Steel ship plates, Scotch, delivered local yards, £6 15s. ($32.84).

Steel rails, export, f.o.b. works port, £6 2s. 6d. ($29.80).

Hematite pig iron, f.o.b. Tees, 65s. ($15.82).

Sheet bars (Welsh), delivered at works in Swansea Valley, £4 17s. 6d. ($23.72), against £4 15s. ($23.12) last week.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £6 5s. ($30.41), against £6 2s. 6d. ($29.80) last week.

Steel bars, export, f.o.b. Clyde, £7 ($34.06), against £6 15s. ($32.84) last week.

Jamaica's total imports of iron and steel in 1913, according to the last official report, were valued as follows: From the United States, $364,420; from the United Kingdom, $846,589; from Germany, $30,960; from Canada, $1865; from all other countries, $11,555. Hardware imports from the United Kingdom were $196,275, as compared with $100,805 from the United States, and $14,765 from Germany. Imports of agricultural steam machinery were valued at $288,480 from the United Kingdom, as against $17,390 from this country, and $3280 from Germany. In galvanized roofing the United Kingdom's exports to Jamaica were valued at $102,760, as compared with $17,860 worth from the United States.

Metal Market

NEW YORK, December 2, 1914.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Nov.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
25	12.75	12.62½	33.87½	3.90	3.75	5.30	5.15
27	12.75	12.62½	33.50	3.90	3.75	5.30	5.15
28	12.75	12.62½	33.37½	3.80	3.67½	5.30	5.15
30	12.75	12.62½	33.10	3.80	3.67½	5.30	5.15
Dec.							
1	13.00	12.75	33.15	3.80	3.67½	5.35	5.20

Copper is quiet, but quotations are higher. Tin is less active and lower. A decline in lead surprised the trade. Spelter is stronger although buying is not heavy. Antimony is unchanged.

New York

Copper.—The market has turned quiet, but it is firm at higher quotations, those of yesterday being 12.75c., cash, New York, for electrolytic and 13c. for Lake. These prices are for December and January shipment. For February delivery ⅛c. higher is asked. On Monday, November 30, the London quotation became easier and the market here was softer as a result, but London strengthened again yesterday and the metal on which prices might have been shaded in this market disappeared. Effective December 1, the price of hot-rolled sheet copper advanced ½c., making the new base 18c. Export figures are unavailable, but foreign shipments are expected to increase in view of the fact that some of the Italian steamships are now willing to carry copper provided it is sent to neutral ports and to neutral consignees.

Tin.—Good arrivals in the last week, two of the notable ones being the Marquette with 830 tons and the Minnehaha with 670 tons, have relieved the tight situation in the supply available for prompt delivery and the market is easier. The quotation yesterday was 33.15c. While a good part of the metal recently received will be applied against old contracts there still will be enough to take care of current demand. Since the last report there has been good buying on but two days, Friday and Saturday, when fair amounts changed hands. At the present time there is 1160 tons afloat. A steamer is due to arrive from Singapore December 15 with 100 tons, which is the largest shipment now in sight. The deliveries in November totaled 2600 tons, of which 400 tons came from Pacific ports.

Lead.—This market has been disappointing to the trade. The largest interest caused a surprise which almost amounted to a shock last Saturday, when it reduced the price $2 per ton, making the new quotations 3.80c., New York, and 3.67½c., St. Louis. The market was regarded as strong and it was believed on every side that it would advance rather than decline. Various theories have been mentioned for the drop in prices, one being that outside producers and speculators were cutting the recently established price of 3.90c., New York, while another is that the higher price interfered with exports.

Spelter.—The New York quotation has advanced to 5.35c., New York, and that at St. Louis 5.20c., although it is generally reported that business in the past few days has not been heavy. Taken as a whole the sales made in the month of November are considered good. From the West it is reported that there is a shortage in zinc ore and that as a result ore prices have advanced. Relief from the shortage is expected when shipments from Mexico are resumed, but there is no certainty as to when this will be.

Old Metals.—The market is quiet but dealers' selling prices have again been advanced, except on lead, and are now as follows:

	Cents per lb.
Copper, heavy and crucible	12.00 to 12.25
Copper, heavy and wire	11.50 to 11.75
Copper, light and bottoms	10.50 to 10.75
Brass, heavy	8.75 to 9.00
Brass, light	6.75 to 7.00
Heavy machine composition	11.00 to 11.25
Clean brass turnings	8.00 to 8.25
Composition turnings	9.25 to 9.50
Lead, heavy	3.55
Lead, tea	3.30
Zinc, scrap	4.00

Antimony.—The market has continued quiet and without change except that quotations are a trifle easier at 17c. to 18c. for Cookson's, 15c. to 16c. for Hallett's and 13½c. to 14½c. for Chinese.

Chicago

NOVEMBER 30.—With the exception of copper, the price of which shows a continued advance, the market gives evidence of being less strongly supported, though no quotable weakness has appeared except for lead. Spelter has recorded a sharp increase in asking price. We have revised quotations as follows: Casting copper, 12.75c.; Lake copper, 13c., for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 34.50c.; small lots, 37.50c.; lead, desilverized, 3.80c., and corroding, 4.05c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.25c.; Cookson's antimony, 18c. to 20c., for cask lots; other grades, 17c. to 18c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 10.50c.; copper bottoms, 9c.; copper clips, 10c.; red brass, 9.50c.; yellow brass, 7c.; lead pipe, 3c.; zinc, 3.50c.; pewter, No. 1, 24c.; tinfoil, 28c.; block tin pipe, 28c.

St. Louis

NOVEMBER 30.—Metals have shown considerable strength, particularly spelter, which reached 5.15c., and is quotable at that to-day. Lead, after a sharp advance to 3.80c., has reacted to 3.70c. Tin is quoted at 35½c.; Lake copper, 14c.; electrolytic copper, 13.75c.; Cookson's antimony, 18c. In the Joplin ore market zinc blende averaged $2 per ton higher. The range for 60 per cent. was $42 to $45 with top settlement $48. Calamine was strong at $22 to $25 for 40 per cent., with top settlement $28. Lead ore was strong at $47. Miscellaneous scrap metals are quoted as follows: Light brass, 5c.; heavy yellow brass, 7c.; heavy red brass and light copper, 8c.; heavy copper and copper wire, 9c.; lead, 3c.; pewter, 20c.; tinfoil, 24c.; zinc, 3c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, December 2, 1914.

The New York Stock Exchange resumed partial trading in securities on Saturday, November 28, after having been closed for four months. The trading is at present restricted to bonds, but, as no stream of liquidation developed on the opening day or on the first two days of this week, it is expected that the confidence thus engendered will influence authorities of the Exchange to throw open shortly the general list of stocks. The Philadelphia Exchange resumed trading on Monday, November 30, with transactions confined to local stocks. Cambria Steel sold at $40 and Baldwin Locomotive preferred at $104.

Dividends

The Railway Steel Spring Company, regular quarterly, 1¾ per cent. on the preferred stock, payable December 21.

The La Belle Iron Works, quarterly, $1 on the preferred stock, payable December 24. Three months ago the dividend paid was $2 a share.

The Standard Chain Company, regular quarterly, 1 per cent. on the preferred stock, payable December 21.

The Packard Motor Car Company, regular quarterly, 1¾ per cent. on the preferred stock, payable December 15.

The Wheeling Steel & Iron Company, 1 per cent., payable December 23. The October dividend had been deferred.

Safety in connection with industrial railroads is the subject of Bulletin No. 16, issued by the National Founders Association. This covers, among other things, the use of guard gates to protect workmen against collision with industrial cars and also shows how the wheels of an industrial car may be guarded, so that the workman is not run over.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

RECOVERY OF PRICE ON COUNTERMANDED ORDER FOR GOODS.—When title to undelivered goods has not passed from the seller to the buyer before the latter countermands his order, the former cannot, by afterward tendering delivery, recover the agreed price; his only remedy is a claim for damages for breach of the contract to buy. (Consolidated Ribbon & Carbon Company vs. Crane Company, 183 Illinois Appellate Court Reports 392.)

WARRANTY OF MACHINERY SOLD.—A manufacturer, in selling a machine, impliedly warrants that it was constructed in a workmanlike manner, and that it is reasonably well adapted to the purpose for which it was made. And, although giving of an express warranty is generally deemed to exclude implied warranties, the mere fact that the manufacturer expressly represents that the particular machine sold is made of the best steel will not exclude the implied warranty as to the quality of workmanship in it and its adaptability to the purpose for which it was manufactured. (Lidgerwood Mfg. Company vs. Robinson & Son Contracting Company, 183 Illinois Appellate Court Reports 431.)

WARRANTIES IN SALE OF MACHINERY.—When an engine is sold under a warranty that it is well constructed and will develop a certain horsepower, but the buyer continues to use the engine for several months after ascertaining that it does not come up to the warranty, he thereby waives the right to rescind his purchase, but may enforce a claim for damages measured by the excess of the value of the engine, as it was represented to be, over its value in its actual condition. (Texas Court of Civil Appeals, Southern Gas & Gasoline Engine Company vs. Adams & Peters, 169 Southwestern Reporter, 1143.)

BREACH OF MANUFACTURING CONTRACT.—Where plaintiff contracted to manufacture 1000 sets of appliances for defendant and had made part of them before defendant repudiated the contract, the damages recoverable by plaintiff were measurable by the contract price, less the cost of manufacturing the remainder, defendant's payment made, the amount received by plaintiff by selling part of the manufactured sets elsewhere, and the value of the appliances remaining in plaintiff's hands. Plaintiff was bound to minimize his damages by selling the manufactured sets at the best price obtainable, however. (Massachusetts Supreme Judicial Court, Bullard vs. Eames, 106 Northeastern Reporter, 584.)

AWARD FOR INJURY UNDER COMPENSATION ACT.—An injured workman's hand is rendered "incapable of use" when it is so impaired that he cannot use it in an ordinary manner, within the meaning of the Massachusetts compensation act, although it remains in such condition that he can use it as a hook. (Massachusetts Supreme Judicial Court, in re Meley, 106 Northeastern Reporter, 559.)

SELLER'S RIGHTS AGAINST BUYER'S CUSTOMERS.—Where a contract to sell iron vests the title to the iron in the purchaser, the seller has no claim against third persons to whom delivery may be made on the buyer's order. (Pennsylvania Supreme Court, Commercial Credit Company vs. Girard National Bank, 92 Atlantic Reporter, 44.)

BUYER'S RIGHT TO RECOVER FOR BREACH OF CONTRACT.—One who has contracted to buy a quantity of iron cannot recover damages as for the seller's breach, on the latter refusing to make delivery, without showing his own readiness and willingness to perform the contract on his part. But where the contract shows that it was understood that delivery was to be made on weights ascertained by a disinterested weigher, the seller cannot compel the buyer to accept delivery on the seller's weights. (Vermont Supreme Court, Burlington Paper Stock Company vs. Diamond, 92 Atlantic Reporter, 19.)

BUYER'S RIGHT TO REJECT SHIPMENT.—When two parties enter into separate contracts for sale of distinct quantities of goods, the mere fact that the first shipment does not come up to the contract requirements does not justify the buyer in refusing to receive the second shipment without examining it. (Sleepy Eye Milling Company vs. Hartman, 184 Illinois Appellate Court Reports, 308.)

DUTY TO SAFEGUARD EMERY WHEEL.—Under the laws of Wisconsin, an employer is liable for injury to an employee, caused by bursting of an emery wheel, where no safeguard was installed, although one was practicable. The amount of $1400 is not excessive recovery for injury to an employee, resulting in paralysis of the muscles of one of his eyes, and decrease in its power of vision 75 per cent., if the accident was attributable to negligence of the employer. (Wisconsin Supreme Court, Sobek vs. George H. Smith Steel Casting Company, 149 Northwestern Reporter, 152.)

BROKER'S RIGHT TO COMMISSION.—Defendant agreed to pay plaintiffs a commission for obtaining an order from an automobile manufacturer for a given number of automobile engines, and for additional services in preparing to fill the order. Plaintiffs secured the contract, but the automobile manufacturer refused to carry it out. Defendant settled with the latter its claim for damages for the breach. Held that defendant is liable to plaintiffs for the agreed commission, less the value of services which remained unperformed by plaintiffs on account of the failure to carry out the order. (Wisconsin Supreme Court, Foster vs. Holbrook-Armstrong Iron Company, 149 Northwestern Reporter, 148.)

RIGHT TO RESCIND CONTRACT ON GROUND OF FRAUD.—When a purchase is negotiated for a corporation by its representatives, on a secret understanding that they shall receive a commission from the seller to be paid out of the price, the corporation, on discovering the existence of this agreement, is entitled to rescind the contract of purchase on the ground of fraud. (United States Circuit Court of Appeals, Sixth District, American Shipbuilding Company vs. Commonwealth Steamship Company, 215 Federal Reporter, 296.)

SELLER'S RIGHT TO RECLAIM GOODS ON BUYER'S BANKRUPTCY.—On bankruptcy of a machinery sales agent, a manufacturer who had consigned pumps to him was entitled to recover possession of those remaining unsold, although the contract was not recorded; goods held by a dealer on consignment not being within the terms of laws which require conditional sale contracts to be filed or recorded. But, as to goods sold outright on open account, the seller is not entitled to reclaim them on the buyer becoming bankrupt, in the absence of fraud in obtaining the credit. (United States District Court, Western District of Washington in re Cladwell Machinery Company, 215 Federal Reporter, 428.)

CONDITIONAL SALE CONTRACT SUPERIOR TO LANDLORD'S LIEN.—Where machinery is sold under a contract reserving title in the seller until payment of the price, and is installed on leased premises, the rights of the seller under the contract are superior to the landowner's lien for rent, although the contract was not recorded. (United States District Court, Northern District of West Virgnia, Jeffrey Mfg. Company vs. Mound Coal Company, 215 Federal Reporter, 222.)

BUYER'S RIGHTS ON BREACH OF WARRANTY.—A buyer is not entitled to rescind a purchase of a machine on the ground of its failure to conform to the seller's representations, unless he acts promptly on discovering the breach of the warranty. And the buyer's acceptance of the machine with knowledge of a defect in it deprives him of all rights except a claim for damages sustained on account of the defect. (Montana Supreme Court, Hillman vs. Luzon Cafe Company, 142 Pacific Reporter, 641.)

KNOWLEDGE IMPUTED TO FOREMAN.—As affecting a manufacturer's liability for injury to a workman while employed at dangerous machinery, a foreman in charge of the machinery is presumed to have observed the presence or absence of proper safety appliances, and to have appreciated the danger of using the machinery without such appliances. (United States Circuit Court of Appeals, Fourth Circuit, Russell vs. Champion Fibre Company, 214 Federal Reporter, 963.)

S. DIESCHER & SONS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

STEEL PLANT REPAIR SYSTEM

Organization at Newburgh Works, American Steel & Wire Company

Bertram D. Quarrie, general superintendent Newburgh works of the American Steel & Wire Company, Cleveland, Ohio, has contributed the following to the discussion of the paper by John Hulst, chief mechanical engineer Carnegie Steel Company, on "The Repair Department of a Modern Steel Plant," read at the Birmingham, Ala., meeting of the American Iron and Steel Institute:

Mr. Hulst has called to your attention the various facilities which he considers necessary adjuncts to a repair department of a modern steel plant finishing 90,000 to 100,000 tons per month.

FOUNDRY NOT ALWAYS PROFITABLE

It is a much-discussed question whether it is advisable to make the necessary capital outlay to include all the facilities mentioned. The presence of an iron foundry at times proves a distinct loss through its operation, by reason of having a blast furnace off, making it necessary to go into the market and buy pig iron for steel making, and consequently for the iron foundry. Furthermore, the ordinary steel plant requires such a diversity of sizes and shapes in castings, that it is practically impossible to rig up the foundry to make quantity production, and hence low costs, there not being enough of one kind of casting to take advantage of this feature. When the pig iron production is curtailed, as mentioned above, the ability to finish this pig iron in the various steel products would enhance the profits to the extent of the tonnage melted. And in times of reduced demand for steel products it is invariably the case that it is possible to contract with iron foundries at advantageous figures for all requirements.

In a similar way, the operation of a steel foundry has at times its disadvantages, and whenever its operation in any way cuts down production of finished steel it is usually found to be uneconomical. The same applies to a roll foundry, and the extent of the diversity of products and the number of rolls required will usually determine the question of the advisability of its installation. If the varieties of product and the number of sections are few, the installation of a roll foundry is usually inadvisable, as it is possible to contract ahead for rolls at reasonable prices to cover requirements.

With reference to the other facilities mentioned, namely, brass foundry, pattern shop, machine shop, electric repair shop, forge shop, pipe shop, structural or boiler shop, roll shop, locomotive repair shop, we think these are essential to the operation of a modern steel plant.

REPAIR DEPARTMENT

In the operation of a steel plant the efficiency and resourcefulness of the repair department is of prime importance. The methods by which work is carried on through the various departments must necessarily be of the best if the maximum production, at lowest cost, is to be obtained from operations. In the repair department the organization should be responsible to the master mechanic. All orders for material for spare and repair parts originate in his office. An outline of organization which we use is as follows:

Master mechanic, assistant master mechanic, clerks,
Chief electrician,
Machine shop foreman,
Structural shop foreman,
Smith shop foreman,
Pipe shop foreman,
Pattern shop foreman,
Carpenter shop foreman,
Bessemer millwright,
Blooming mills millwright,
Finishing mills millwright,
Iron and brass foundry foreman,
Steel foundry foreman,
Boiler house foreman,
Locomotive repair foreman,
Rigger foreman.

In addition to the above-mentioned organization, the roll shop foreman and master mason are considered a part of the repair department.

The continuity of operation of a steel plant, from the blast furnaces to the shipping dock, depends primarily upon the ability of this repair organization to anticipate the wearing out of parts, and be prepared at all times to make renewals in the shortest possible time when they become necessary. In order to insure this a system of close inspection is absolutely necessary. The frequency of these inspections is dependent on the part of plant involved.

ELECTRICAL AND OTHER INSPECTIONS

The chief electrician has in his department motor inspectors, whose duties require them to inspect every motor every day to see that the motors and controls are in proper shape. All cranemen in the plant are responsible to the chief electrician, and each one is made responsible for the condition of his crane, and required to report electrical or mechanical troubles to his superior. In addition to the reports from crane operators there is a weekly inspection of all cables and wire ropes in the plant by a rigger, whose duties are the making of all splices and maintenance of proper slings, etc., for the riggers' department. Experience has taught us that it is necessary to change cables and wire ropes at certain stated intervals, especially those on cranes handling hot metal, and that it is best not to wait until broken strands or frayed ropes show danger signals.

In addition to above inspections of cranes, the safety department makes weekly inspections of cranes and reports on condition of mechanical and electrical apparatus in addition to the condition of safety devices thereon. In case of repairs to motors, the changing of armatures, installing new bearings, or changing motor entirely, the chief electrician has a few riggers available, whose principal duties are in connection with this work for electrical department, and consequently they become skilled in handling electrical apparatus with little damage to motors and machinery. We have always felt that the placing of all cranemen in the plant under the electrical department gives the best results, due to chances of promotion of cranemen from one department to another, and also gives us men who are anxious to keep their cranes in good condition at all times.

WORKING FEATURES OF THE SYSTEM

The department millwrights are representatives of the master mechanic in the various departments, with their quota of machinists, helpers, oilers, etc., to look after the mechanical end of the work. The method pursued in obtaining spare parts for any point in the plant is as follows: The millwright will write a requisition on the stores department, and detail the part by pattern number (our pattern numbers are same as drawing numbers on which the part is detailed, with a suffixed letter to agree with letter on drawing) and the castings clerk will issue the part in question, the delivery either being direct to department or to the machine shop for finishing.

The stores department have under their control all castings in rough or finished state and honor requisitions on presentation. A castings clerk keeps accurate record of all castings received and issued, and at all times has an actual inventory at hand for the information of the mechanical department, and as parts are issued will issue further requisitions on the various foundries or forge or structural shop to keep the stock of spare parts or repair parts at a predetermined minimum number. Periodical inspection of the stock of this material on hand is made by the master mechanic or his assistants, to be sure that changes made in design or material have not been overlooked and that material on hand is of correct amount for ordinary renewals or repairs.

One of the most important features of a good repair department is a force of riggers able to handle their work to the best advantage, and keep the delays through break-downs to a minimum.

A good rigging department forms the nucleus of a mechanical organization, and from it we draw our oilers, machinist helpers, cranemen, etc. The rigging department looks after all the painting, the changing of cables and wire ropes, also transmission ropes, the loading and unloading of material other than that

handled with a shovel or by hand, the cleaning of roofs and all repairs requiring rigging of any kind. The continued handling of these various repair jobs has brought the rigging to a standard and there is little time lost in preparing for any one.

The millwrights in the various departments have under their control the locomotives, engines, pumps and hydraulic systems, all of which require close attention, and they order the repairs made through the department interested. The engines for heavy repairs are sent to the locomotive repair shop, the hydraulic systems are taken care of by the pipe shop in case of leaks or renewals, while the packing of same is taken care of by a packing man in each department.

In packing the various points throughout a hydraulic system it often becomes necessary to renew packing that is apparently good, where its continued use might cause a serious delay of operations were it allowed to remain in service. This seems at times to cause excessive packing costs, but consideration must be taken of the loss in product, due to delays at inopportune times under stress of tonnage requirements later, particularly true of mills whose finishing capacity is less than the total steel making capacity, and whose maximum tonnage is necessary to fill orders for rolling.

EXCESSIVE SPARES AVOIDED

The inspection of hydraulic lines and fittings at certain intervals is necessary in order to insure continued operation, and to guard against accidents occasioned through breakages. For a given condition in a mill it is advisable in the case of motor drives to have a series of motors which are interchangeable, making the carrying of excessive spares unnecessary. This same idea should be carried further with regard to feed rolls, bearings, drives and many other cases which could be brought up, duplicate, so far as is possible in order to keep down the spares necessary for continuous operation. The continued failure of any part gives rise to study of design or material which will obviate difficulties encountered, and places which formerly caused much annoyance gradually become as stable as the rest of the mill. The introduction of rolled sections for crane wheels, gears and the use of heat treated or special alloy steels for pinions, bevel gears and mill pinions have done much to reduce work and worries of the repair department.

The use of special appliances such as are spoken of in Mr. Hulst's paper have also tended to reduce the responsibilities of the repair department.

The engineering department is of vital importance in connection with repair work, and all new work is carefully gone over by all concerned in its operation. Care is taken that the new work is of the best and most substantial, and with an eye to minimum cost of upkeep and repairs.

The United States Metal Products Company, whose office is at 111 Broadway, New York, and factory at College Point, L. I., has again passed into receivers' hands. A voluntary petition in bankruptcy was filed Monday, November 30, and the receivers appointed are P. Tecumseh Sherman, Albin B. Turner and Thomas C. Clarke. Liabilities are placed at $1,008,550 and assets nominally at $2,965,866. The application states that the assets are not likely to realize more than $900,000. The company has been known to be in financial difficulty for some considerable time.

Austrian iron and steel plants, according to late advices, have either had to shut down or reduce their output because of lack of supplies and labor. While stocks were large at the outbreak of the war, they are now much reduced, but orders are coming in in sufficient quantities to enable plants to operate on a small scale. Prices have not been changed thus far, it is stated.

The J. K. Stewart Mfg. Company, Wells Street Bridge, Chicago, which makes die castings by the Stewart process, has changed its name to the Stewart Mfg. Company.

BRITISH STEEL EXPORTS

Falling Off in War Months Over 40 Per Cent.—Ferromanganese Loss Small

The iron and steel exports of Great Britain for the 10 months of 1914 show a decrease both in tonnage and values from 1913, though it should be said that the decrease began before the war. The total sent abroad to November 1, 1914, excluding iron ore and scrap, was 3,441,157 gross tons against 4,151,081 tons in the first ten months of 1913, a decrease of 709,924 tons. The falling off in values was £8,847,834, or from £45,634,880 to £36,787,046. In pig iron, including ferroalloys, the decrease in exports was 251,127 tons, the total to November 1, 1914, being 699,320 tons against 950,447 tons. Ferromanganese exports in October were 12,661 tons and in September 13,906 tons, against 14,438 tons and 15,971 tons respectively in the corresponding months of 1913. The exports of galvanized sheets were 518,766 tons or 112,318 tons less than for the first ten months of 1913.

Imports of iron and steel, excluding iron ore and scrap, to November 1, 1914, were 1,502,548 gross tons against 1,816,098 tons to November 1, 1913, a decrease of 313,550 tons. The values for these two periods were £9,917,356 and £12,558,339 respectively, a decrease in imports of £2,640,983 as compared with last year.

It is interesting to note that while in August, under war conditions, the export figures showed a falling off of 47 per cent. and in September of 41 per cent., in October they were only 39 per cent. down. Imports of iron ore were 460,000 tons in October, or about 100,000 tons less than the average of the two previous Octobers.

THE FERROMANGANESE SITUATION

In reviewing the export and import statistics for October, the London Iron and Coal Trades Review has the following on the ferromanganese situation:

Of manganese ore we imported in October close to 40,000 gross tons, or much about the same as usual. The exports of ferromanganese were also on a fairly large scale, being about 12,500 tons as against 14,500 tons in October last year. Practically the bulk of this went to the United States, but the position requires careful watching. The sales agents for English ferromanganese in the United States have now been requested not to make sales for re-export to Europe as considerable resale ferro has already been purchased for shipment to Sweden, and further inquiries are out which point to shipments far in excess of the normal and most probably destined eventually for Germany. There is no reason why Sweden and Italy should go to the United States to buy ferro when purchases from this country are available to *bona fide* buyers. We have already pointed out that there is little hope of doing much damage to the German iron and steel industry by making iron ore contraband, but in spite of several deposits of manganese ore of relatively small output in Germany there is almost certain to be a shortage in ferromanganese if the German production of steel continues at even its present reduced rate of 6,000,000 tons a year.

A method of handling boilers to prevent corrosion and scale is to be described by Allen H. Babcock, consulting electrical engineer of the Southern Pacific Company, at a meeting of the American Society of Mechanical Engineers to be held at San Francisco, December 8.

The Bucyrus Company, South Milwaukee, Wis., has been awarded the contract for furnishing four large electric drag line excavators for a land reclamation project in Missouri. Two of the machines will be the largest of this type ever constructed.

The Maine Central has ordered seven Mikado locomotives from the American Locomotive Company.

FOR BLAST FURNACE STOVES*

A New Process for Accelerated Heating—Economies in Gas, Coke and Capital

BY A. SPANNAGEL

A description of the new method, known as the Pfoser-Strack-Stumm system for the acceleration of the heating of Cowper stoves, was published by H. Schmalenbach, works manager at Neunkirchen in Stahl und Eisen, Feb. 19, 1914, but as the principle may perhaps not yet be generally known some account of its further development may be of interest.

The almost universal practice is to heat up the stove for 3 to 5 hours, and then to remove heat by sending the blast through for 1 to 1½ hours. Why should the chequer work give up its heat to the blast in a so much shorter time than is required to collect the heat from the waste gases? In searching for the explanation of this phenomenon, it occurred to the originators of the method that the difference in the velocity of the gases during the periods of heating and of removal of heat had something to do with it, and it is this fact that gave the solution to the question, and forms the principle on which the subsequent invention is based.

THEORY OF THE PROCESS

It is generally known that under present conditions, when it is required to raise the temperature of the stoves, which is done by sending through a larger quantity of gas in a given time, the temperature of the waste gases rises, and the waste gas losses are increased, that is, the efficiency is reduced. By practical experiments it has been determined that this rule only holds good up to a certain point. If the supply of products of combustion is increased beyond a certain amount, the waste gas temperature not only ceases to rise, but begins to fall.

This apparent contradiction may be explained by a consideration of the conditions under which the transmission of heat takes place in the channels of the chequer work. Through each channel there flows a current of gas, which may be imagined as consisting of innumerable gas molecules. With a low velocity it may be assumed that the molecules flow almost parallel to each other through the channels, the friction with the bricks being inconsiderable. Therefore only those molecules flowing close along the channel walls transmit their heat direct by contact, while the inner ones in the center of the current can only impart their heat slowly by radiation. Thus, if the quantity and velocity of the products of combustion are low, the heating period will be very long with low waste gas temperatures.

If, now, the velocity of the heating mixture be increased to about the maximum usual velocity, the friction of the gas particles against the bricks causes eddying in the outer layer of gas, and the inner particles are also thereby partly brought into motion. The heat transmission becomes more rapid, but since the quantity of gas is considerably greater in consequence of the increased velocity, a larger proportion of the heat is carried off unused. That is, the heating period is shortened, but the temperature of the waste gases is raised. By increasing the velocity still more, the gas molecules finally come to be driven with force through the channels, and the friction against the bricks becomes so great that the particles rebound and impart their whirling motion to those in the very center of the current. The violent eddying brings all the molecules within a very short time in contact with the bricks, and they give up their heat more rapidly, with the result that the waste gas temperature falls. The amount of heating gas and quantity of heat introduced in a given time is, however, greater, so that the heating period is shortened.

ADVANTAGES OF THE SYSTEM

The new system offers the following advantages:

1. The ability to shorten the heating period down to or below the period during which the stove is under blast. Consequently two stoves are sufficient to serve one blast furnace, or, in practice, five stoves will serve two blast furnaces, one being kept in reserve. In a new plant this means a saving both in capital costs and space. With fewer stoves in operation there will also be a reduction in the great losses due to radiation with a corresponding saving in gas.

2. By keeping to the same heating period the stoves can be brought up to a much higher temperature, owing to the greater quantity of air and gas consumed, and by increasing the temperature of the blast an economy in coke will result.

3. An almost uniform blast temperature can be maintained by running two stoves in series. This is quite practicable where four stoves are attached to one blast furnace. The hot gases can be driven through two stoves in succession, and the blast afterwards sent through in the reverse direction. Such an arrangement is equivalent to having two stoves of double the ordinary hight. The blast can be kept at a high and nearly even temperature; the waste gas temperature is very low, and the heat of combustion is well utilized.

The first tests with the system were made at Neunkirchen in February, 1913, on an old stove 25 meters (82 feet) high and 6.5 meters (21 feet) in diameter. After long consideration the plan was tried of forcing a larger volume of waste gas through the stove by blowing in compressed air from the cold-air main through a fire-brick nozzle built into the combustion flue. The heating period of the stove under test was immediately reduced at the first trial to about 1½ hours, the temperatures of the waste gases and of the blast being 350 deg. C. maximum, and 800 deg. C. respectively, as compared with the former heating period of 4½ hours to 5 hours, and a waste gas temperature of about 700 deg. maximum, the blast temperature being the same.

Comparative tests with a stove at Burbach showed that with the new system, and with a heating period of 1 hour, the same temperatures for blast and waste gases were maintained as when heating for 3 hours under the old system. The results of the tests are given in the following table, and they refer to working with uncleaned gas or rough-cleaned gas:

Mode of heating	Heating period, hours	Blast period, hours	Mean blast temperature in deg. C.	Fall of temperature in deg. C.	Mean waste gas temperatures in deg. C.	Volume of blast, cubic meters per hour
Usual method used hitherto	3	1	876	150	445	26,700
New method	1	1	867	185	431	28,100

In an experimental stove put in operation at Neunkirchen in May, 1914, the brickwork was composed of a new form of brick having eight sides and presenting a much larger heating surface than the hexagonal bricks usually employed. This stove, after heating for 1½ hours, was purposely left un-

*From a paper prepared for the abandoned fall meeting at Paris of the Iron and Steel Institute.

der blast for 2 to 3 hours, in order to show the great quantity of heat stored up. After 3 hours the temperature of the blast had only fallen by 180 deg. C. The waste gas temperature at the end of the heating period in the new stove was 90 to 116 deg. C., whereas in the stove on the old system it was 410 to 440 deg. at the end of 1½ hours. These results prove that it is possible with the Pfoser-Strack-Stumm system, and with the new form of brick, to maintain the same blast temperature when the heating period is reduced to a ratio of less than 1:1, and, at the same time, to obtain a lower waste gas temperature than has ever before been found practicable.

As an illustration of the very remarkable economic importance of the new system, the following example may be referred to:

The blast furnace installation at Neunkirchen consisted of 5 blast furnaces, each of 170 tons daily capacity, with 19 stoves. A sixth blast furnace is in course of construction, for which it is not required to erect a new stove. On the contrary, 4 of the old stoves are being pulled down to make room for the new furnace. In future, therefore, there will be 6 blast furnaces working with 15 stoves, of which latter not more than 12 will be running continually.

It is scarcely necessary to emphasize the saving in capital cost in this case. The regular economies in gas and coke which can be obtained by the adoption of the new system are even more important.

The system is applicable to other purposes besides the efficient heating of stoves. Experiments which have already been made in boiler firing have given particularly favorable results. Without making costly alterations, the evaporative capacity of Cornish boilers has been more than doubled, though the waste gas temperatures were lower than under the old system of working.

Our Trade with Argentina

WASHINGTON, D. C., December 1, 1914.—The foreign trade of Argentina and the share of the United States therein for the calendar year 1913 and for the first half of 1914 are shown in statistics just received by the Bureau of Foreign and Domestic Commerce. These statistics include the imports of iron and steel products and are interestingly supplemented by figures compiled by the bureau from our customs returns showing in some detail our exports of these products to Argentina in the fiscal year 1914 as compared with 1913 and 1912. The figures reflect the world-wide depression as well as the financial crisis through which Argentina has been passing in the past two years.

The total foreign trade of Argentina in the calendar year 1913 amounted to $873,187,088, comprising imports of $406,605,200 and exports of $466,581,888. The total importations of iron and steel were valued at $48,288,890. Of the total imports in 1913, general merchandise to the value of $59,843,093 was imported from the United States, while the total exports to this country in the same year amounted to $22,086,622, from which it will be seen that there was then a heavy balance of trade in favor of the United States, amounting to more than $37,000,000.

The figures for the first half of the calendar year 1914, however, show marked changes in the trade movement. The total imports for the six months ended June 30, 1914, were valued at only $165,030,832, or much less than half the total for the calendar year 1913. The total imports of iron and steel products, however, aggregated $27,587,488, or much more than half the imports of these articles in the calendar year 1913. The total exports for the first half of 1914 were valued at $206,253,267, a material decline as compared with the figures for 1913, but proportionately less than the loss in imports. The trade with the United States in the first half of 1914 showed a peculiar trend. The imports from this country were valued at only $20,278,002, while the exports to the United States rose to $22,736,129, showing a balance of trade against this country of about $2,500,000 for the half year. This decline in imports is attributed in large part to the general depression prevailing in South America and especially in Argentina, while the large increase in exports, amounting to more than 100 per cent., is due to the Underwood-Simmons tariff law, which has enabled Argentina to send to this country unprecedentedly large quantities of beef, wool, etc.

The United States supplies from 20 to 25 per cent. of the iron and steel products imported into Argentina, but in the past three years both the total imports of these products and the share of the United States have declined. The total value of iron and steel and manufactures thereof shipped from the United States to Argentina in the fiscal year 1914 was $10,861,527, as compared with $11,019,930 in 1913 and $13,697,057 in 1912. The figures in detail, which have been specially compiled for *The Iron Age* by the Bureau of Foreign and Domestic Commerce, are as follows:

	Fiscal years		
	1912	1913	1914
Builders' hardware and tools	$949,104	$965,067	$855,422
Firearms	245,704	205,088	209,473
Cash registers	127,009	260,526	396,872
Locomotives	9,986	.....	25,600
All other engines and parts	1,342,578	954,727	583,746
Printing presses	146,475	89,845	15,815
Pumps and pumping machinery	429,083	182,780	270,693
Sewing machines	724,134	880,141	962,682
Typewriting machines	387,121	355,320	300,711
Windmills	1,072,489	558,146	668,002
All other machinery and parts	1,720,704	1,481,919	1,708,102
Pipes and fittings	367,010	224,165	340,827
Rails	862,511	695,018	861,281
Scales and balances	112,504	121,284	80,731
Sheets and plates	1,778,283	907,262	125,060
Structural iron and steel	326,304	94,779	664,084
Wire	1,608,502	1,298,587	669,017
All other iron and steel manufactures	1,427,556	1,746,276	2,130,309
Total	$13,697,057	$11,019,930	$10,861,527

The official advices of the Department of Commerce indicate that while the imports into Argentina in the second half of 1914 will be smaller than in the first half, the share of the United States therein will be much larger, owing to conditions due to the European war. In the first half of 1914 the United States held third place among the countries supplying this market, and furnished 12.3 per cent. of the total imports, Germany holding second place with 17.4 per cent., while Great Britain stood first with 34.4 per cent. Great Britain will probably continue to lead throughout the year, but it is believed that the United States will forge ahead of Germany. While our gain in exports will be due chiefly to the great war, it will in a substantial measure be attributable to the rapid increase in our importations from Argentina. W. L. C.

In one year of application, serious accidents at the plant of the Goodyear Tire & Rubber Company, Akron, Ohio, employing 7500 men, have been reduced 33 per cent. by the safety movement. Minor injuries to employees have decreased in the same proportion. Elevator gates are equipped with screens to prevent articles falling down shafts. Trucks and core stands are inspected every week. Slippery floors have been treated. Rubber mats are laid wherever helpful. Repeated tests have shown that rubber heels are a safeguard against slipping, and heels are furnished the men in many departments.

The Bruce-Macbeth Engine Company, Cleveland, Ohio, furnished a long list of orders which have recently been placed for the Meriam steam process of generating low-pressure steam by means of the waste heat of gas engines. This process is the invention of J. B. Meriam, engineer of the company.

The annual report of the Canadian Department of Customs gives the grand aggregate of Canadian trade, according to revised figures, as $1,129,744,725 for the fiscal year ended March 31, 1914. The exports amounted to $478,997,928 and the imports to $650,746,797.

Measuring Efficiency in Industrial Work*

A Cost System Not to Criticize Factory Operation Adversely But to Check Deeds by What They Should Be

BY H. L. GANTT

It is unfortunate that the term "efficiency engineer" was ever invented, for every engineer is engaged in the work of promoting efficiency, and it seems presumptuous for any class of engineers to arrogate to themselves a title which implies that they are preeminently promoters of efficiency. A more correct appellation would be "management" or "industrial" engineers.

Waiving the subject of name, however, it is certainly a fact that the agitation of the subjects of management and efficiency during the past few years has caused many employers to study their management problems very much more closely than heretofore, with the result that there has undoubtedly been a marked improvement in the efficiency with which industrial operations as a whole are being conducted.

LITTLE BETTERMENT IN EMPLOYER-EMPLOYEE RELATIONS

So far so good. But in spite of this increase in efficiency, the greatest of our industrial problems, the relation between the employer and the employee, seems but little nearer solution. While there has been a distinct improvement in isolated cases, these cases are few compared with the total number, many of which show no improvement whatever.

It is safe to say then, that the promotion of efficiency is not alone sufficient to serve the needs of a nation that aspires to be a leader in industrialism. As a matter of fact one of the most efficiently run plants I have ever seen promises, unless my theories are all wrong, to widen the gap between employer and employee. The solution lies deeper, and before we can make any real progress toward it we must revise some of our fundamental conceptions.

With the growth of competition within the last 20 years the necessity for some knowledge of costs became evident, and the manufacturer turned to the accountant for a system of finding costs. The present system of railroad accounting had been developed, and certain ratios accepted as measures of efficiency of operation; notably among them the ratio of operating expense to total income. Being accustomed to having the managerial efficiency of railroads expressed by a simple ratio, the financier demanded a similar simple measure of the efficiency for an industrial plant. The cost accountant promptly gave him what he called the ratio of "non-productive" to "productive" labor, which he said should be low for good management. By "non-productive" labor he meant salaries of all kinds, and all other labor that could not be charged directly to an order, including miscellaneous labor such as watchmen, sweepers, truckmen, etc. By "productive" labor was meant simply that labor which could be charged directly to an order.

PROPORTION OF INDIRECT LABOR NO MEASURE OF EFFICIENCY

While the ratio of operating expense to total income may be a fair measure of efficiency in a transportation company, the ratio of "non-productive" to "productive" labor is not only not a fair measure of the efficiency of operation in a manufacturing plant, but is often exactly the reverse. To my mind the widespread use of this ratio as a measure of efficiency has been more effective in producing inefficiency than any other single factor except the oft-repeated statement that you must have low wages if you would have low costs. Until these two fallacies are absolutely discredited, we cannot expect a solution of our most serious problems.

Of these two fallacies, the second, namely, that you cannot have high wages and low costs, seems to be yielding gradually to the overwhelming mass of evidence against it. So many cases are now on record where the industrial engineer has increased output, raised wages, and at the same time lowered costs, that only those who are too conservative to investigate are still holding on to the old theory. Better still, many employers have shown the courage of their convictions by adopting a scheme of management for the increase of output and the reduction of costs, which they are perfectly well aware will make a decided increase in wages. With evidence of this kind at hand, it is safe to say that this fallacy will before long be entirely discredited. On the other hand it must be fully understood that something more than a simple increase in wages is necessary to increase output, and if nothing is done but to increase wages we are sure to get higher costs. The other fallacy, that the ratio of "non-productive" to "productive" labor is a gage of efficiency, is so firmly rooted, however, that it is hardly to be expected that it will yield in the near future.

In considering this subject I wish to call attention first to the terms "productive" and "non-productive" labor, which seems to me to be misleading. If any expense is "non-productive," namely, does not contribute to the end for which the factory was established, it should be eliminated. The salaries of the officers, foremen, janitors, truckmen and laborers, as well as the money paid for taxes, insurance or interest are necessary to the operation of the factory and therefore productive. They are, however, not chargeable usually to any specific order, but must be distributed over all the work done according to some definite rule. I prefer to call all such expenses that have to be distributed "indirect" expenses, and those that are chargeable to specific orders "direct" expenses. The ratio which we have in mind is thus more correctly described as that of "indirect" to "direct" labor. This, however, is a matter of names and does not affect the fact that to base any conclusions as to the efficiency with which factory is run on this ratio is misleading, and to attempt to use it as the gage in operating a factory may be, and often is, productive of inefficiency rather than efficiency.

FALLACY OF THE COMMON GAUGE OF EFFICIENCY

This fact can best be made clear by a series of examples. In a factory where this ratio was used as a guide the following incident occurred:

A foreman had 10 men on a job, which he said could be done by 8 if he could have a boy to supply them with work. He said, however, that if he made the change, the boy's wages would be called "non-productive" labor and his ratio would go up, with

*Paper, substantially in full, presented December 2 before the American Society of Mechanical Engineers, New York.

the result that he would be criticized, so he did not make it.

In the U. S. Navy an energetic officer studied the loading of ammunition and very much reduced the direct labor employed, but, being unable to reduce the indirect labor in the same proportion, the above ratio went up. He came in for very severe criticism, notwithstanding the fact that his total labor had been decidedly reduced.

I might give numerous examples of this kind, including one where 2 men took the place of 16, and a daily direct wage of $8 took the place of $48, with but little increase of the corresponding indirect expense. The result of this and other changes was that the ratio for that shop became over double its former value, with a marked reduction in the total cost. Needless to say, that the ratio theory in that plant is not regarded with the same reverence that it once was.

A RELIABLE COST SYSTEM THE ESSENTIAL

Inasmuch, however, as the efficiency of the operation of a factory is made up of the efficiency of a great many independent operations, and is really indicated only by the cost of the various articles produced, there has not yet been found any easy way of indicating the efficiency without first getting the cost of the individual articles. Hence there is no readily available idol that can be substituted for the discredited one. Having been accustomed to an idol, however, both the accountant and the financier demand one, and are loathe to give up the idol they have so long worshipped no matter how badly shattered it may be. When, however, a reliable cost system has been installed, this idol becomes so badly discredited that even its most devoted high priests are obliged to abandon it.

In speaking of the cost systems, we must discriminate between cost systems and expense systems. Before we can get correct costs we must have a correct knowledge in detail of all the expenses of a plant, and some idea of how to combine these to get costs.

Everybody is agreed that all expense of material or labor that can be readily charged to an order should be so charged, but whether the indirect labor and expense should be charged in proportion to direct labor or machine hours, and how other items of rent, taxes, insurance, etc., should be distributed, are questions which it seems to me should be largely determined in each case on its merits. I have never yet seen any general scheme that seemed to suit all cases.

We shall therefore confine ourselves to the consideration of what the essential elements of a reliable cost system are, and how to get an exact knowledge of them. These elements are a knowledge each day of (a) what was done the day before; (b) who did it, and (c) what was paid for it. It is necessary to check these items daily, for it is impossible to check them accurately after the lapse of any appreciable time.

It is comparatively easy to get a set of returns purporting to give the above information, but the real difficulty comes in knowing whether these returns are correct or not. The only sure way of knowing whether these returns are correct or not is to know beforehand (a) what should be done the next day; (b) who should do it, and (c) what should be paid for it.

When we have arrived at a condition under which we can plan our work in advance on these lines, we have the basis of a real system of management, in which we can promptly check what has been done with what should have been done, and know with certainty each day how we stand.

COST OF CLERICAL FORCE OF NO CONSEQUENCE

When it is realized that the installation of such a system seldom results in an increase of output of less than 25 per cent., and often as much as 100 per cent., it is easy to see that the additional clerical work cuts but little figure. As a matter of fact the clerical work needed to operate the best systems of this type is decidedly less than that needed to operate any of the standard cost systems put in by chartered accountants.

It must be borne in mind, however, that during the process of installing the new system and training the employees to operate under it, the old system must be continued; and not until each function performed by the old has been taken over by the new can we drop the old entirely. During the process of installation, therefore, we must to a large extent operate two systems. This necessarily runs up the ratio of "non-productive" to "productive" expenses, and the accountant lifts up his hands in horror at the expense the new system is running them into. If at the same time the new system is successful in reducing the "productive" labor, the ratio is still higher, and the "showing" is still worse, even though the total cost is less.

MUST REVISE IDEAS OF OBJECT OF COST SYSTEM

The first step is to revise our ideas as to the functions of a cost system. In the past the principal function of a cost system, besides indicating a limiting selling price, has been to enable those in financial control to criticize those operating the factory. These criticisms are usually from one to three months late, and are so general in their character as to afford, as a rule, no guide whatever by which the superintendent can be governed. Such a system is too often most highly prized for its worst defect, namely, that it enables those in financial authority to criticize without taking any responsibility whatever for showing how to do better.

If, instead of making the function just described the prime one, we raise to equality with it, a function which requires the system to furnish promptly, day by day if necessary, exact information of what has been done and what the expenditure has been, we shall find that its most valuable function becomes, not finding costs, but furnishing the superintendent with information which helps him to reduce costs.

In other words, before we can expect to get any great benefits from the newer managerial ideas, we must readjust our ideas of the functions of the cost accountant, who must become the servant of the operating executive as well as of the financial executive.

As long as the cost accountant is simply a critic, he may be called "non-productive," but when he furnished the superintendent with prompt information which enables him to reduce costs he becomes "productive." Promptly detailed information of what is being done each day, furnished in such manner as to be readily compared with what has been done, and what can be done, is the best method of measuring efficiency.

A. A. Landon, vice-president of the American Radiator Company and general superintendent of all its plants, announces that the business of the company is now back to normal volume and that its full working force at its three Buffalo plants—the Pierce, the Bond and the Standard—will be employed. For some time these plants have been working an average of five days per week, but orders lately received warrant the company in putting all employees at work six full days each week.

The Cause of Brittleness in Soft Steel

German Tests on a Krupp Shock-Testing Machine, Showing the Effect of Working at a Blue Heat

The extreme brittleness brought about in soft steel by working at a blue heat, that is, from about 400 to 650 deg. F., is a well-known phenomenon. It is often so great that insignificant causes, especially light blows and shocks, are sufficient to cause fracture. There are, however, no exact figures to show to what extent the brittleness of soft steel is increased by working at a blue heat, and to remedy this the results of the work of Dr. E. Preuss, of the University of Darmstadt, were published in a recent issue of Stahl und Eisen. [Dr. Preuss is one of many German engineers who have fallen in the great war.—EDITOR.]

In order to test for brittleness a Krupp shock-testing machine was used, the principle of which is shown diagrammatically in Fig. 1. The small weight or hammer B falls from a fixed hight between the guides F on to the test piece P. It is raised by the rods S that are joined together at the top by a head, which is actuated by a cam. The test piece, 15 mm diameter, has a sharp cornered notch turned in the middle 1 mm deep, so that the diameter at this part is 13 mm (0.512 in.). The weight is 4.19 kg. (9.24 lb.), the hight of drop 3 cm. (1.18 in.) and the number of blows 85 per minute. After each blow the piece is automatically turned 180 deg., so that the successive blows come on alternate sides. The number of blows to the beginning of fracture is taken as the measure of the quality and toughness of the steel. With brittle material that only stands a few blows the fracture is completely uniform. With tough material, on the other hand, there is a fine structure on the sides where the blows fall, and in the center an elliptical coarse-fractured part, representing the portion that broke last. The width of this part is less the better and tougher the material, so that this dimension "a" (Fig. 2) may also be taken as a measure of the quality of the material.

The tests were carried out on three grades of ordinary soft steel, with physical properties shown in Table 1.

Table 1.— Physical Properties of Soft Steels Tested

Material	Elastic limit, lb. per sq. in.	Ultimate stress, lb. per sq. in.	Ratio	Elongation per cent.	Reduction of area, per cent.
A	48,216	62,155	78.0	22.9	43.0
B	42,242	56,608	75.0	29.1	67.0
C	39,682	56.039	71.0	30.6	68.0

From the three rods A, B and C eight tests were cut, numbered one to eight. Numbers 1 and 5 were tested as received. The remaining pieces were heated in an oil bath electrically. Numbers 2, 3 and 4 to 250 deg. C. (482 deg. F.) and numbers 6, 7 and 8 to 300 deg. C. (572 deg. F.). While at these temperatures they were loaded to the elastic limit and slightly beyond, being stretched 2, 5 and 10 mm respectively, which in the 120-mm length corresponds to 1.7, 4.2 and 8.3 per cent. No incipient fracture was produced even by stretching 10 mm. Test bars were turned and broken in the special shock-test machine. The results are shown in Tables 2, 3 and 4 and Figs. 3, 4 and 5.

Material A shows an increase in brittleness even when only stretched 1.7 per cent. and this brittleness is very marked in the pieces stretched 4.2 per cent. The worst result was obtained with the bar

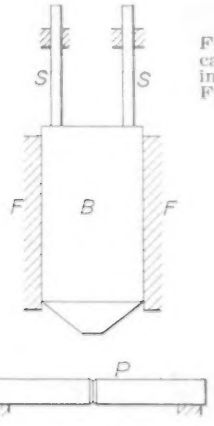

Fig. 1

Fig. 1—Krupp Shock Testing Machine Shown Diagrammatically. Fig. 2—Cross-Section of Test Piece, P (Fig. 1), Showing Fracture "a." Fig. 3—Results of Tests of Material A. Fig. 4—Results of Tests of Material B. Fig. 5—Results of Tests of Material C

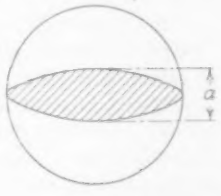

Fig. 2

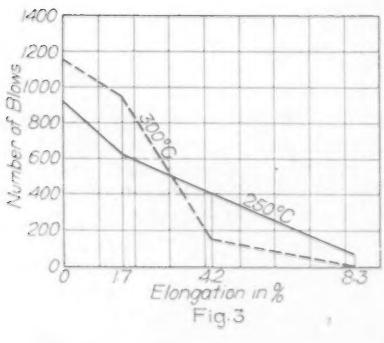

Fig. 3

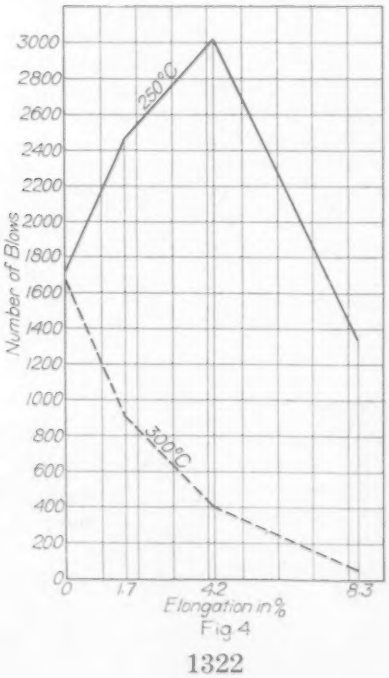

Fig. 4

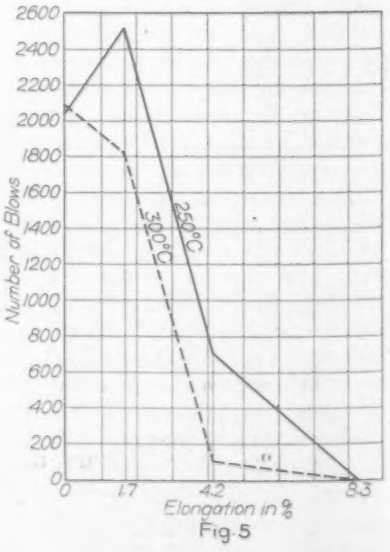

Fig. 5

heated to 300 deg. C. and elongated 8.3 per cent., for it only stood six blows. The effect of working at a blue heat is very clearly shown in Fig. 3. In the case of material B, the results are somewhat different. The bars, stretched 1.7 per cent. and 4.2 per cent. at 250 deg. C., do not show a decrease but an increase in the number of blows. It is probable that the material as furnished was not in the best condition, but was somewhat brittle and was benefited by being heated to 250 deg. C. This benefit being greater than the harm caused by stretching up to 4.2 per cent. With 8.3 per cent. the result is a less number of blows than required for the steel as rolled. At 300 deg. C. the bad effects of working considerably exceed the beneficial influence of heating, the number of blows decreasing steadily as shown in the diagram.

Table 2.—Results with Material A.

Piece No.	Stretching temp. in deg. C.	Elongation produced, per cent.	Number of blows
1	20	0.	926
2	250	1.7	624
3	250	4.2	396
4	250	8.3	61
5	20	0.	1,154
6	300	1.7	961
7	300	4.2	151
8	300	8.3	6

The width "a" (Fig. 2) was not measured, because of a defect found in all the bars.

Table 3.—Results with Material B.

Piece No.	Stretching temp. in deg C.	Elongation produced, per cent.	Number of blows	Width "a"
1	20	0.	1,721	1.9 m m
2	250	1.7	2,451	4.9
3	250	4.2	3,021	7.4
4	250	8.3	1,344	13.0
5	20	0.	1,665	2.0
6	300	1.7	901	10.3
7	300	4.2	401	13.0
8	300	8.3	56	13.0

Table 4.—Results with Material C.

Piece No.	Stretching temp. in deg C.	Elongation produced, per cent.	Number of blows	Width "a"
1	20	0.	2,040	1.8
2	250	1.7	2,517	4.5
3	250	4.2	702	11.0
4	250	8.3	9	13.0
5	20	0.	2,090	1.9
6	300	1.7	1,807	5.8
7	300	4.2	110	13.0
8	300	8.3	3	13.0

With material C the bar heated to 250 deg. C. and stretched 1.7 per cent. shows an increase in the number of blows, but all the others show a decrease, those elongated 8.3 per cent. only standing nine and three blows respectively, and the dimension "a" of Fig. 2 extending clear across the fracture.

From the foregoing it may be said that a small elongation of soft steel at a blue heat is sufficient to bring about remarkable increase in brittleness. In all cases the higher temperature gives the worst results. The brittleness increases very rapidly with increase in the amount of elongation given. It is the more extraordinary because no change in structure can be found even with the highest magnifications. If this were not the case it would be easy to separate the brittle material by microscopic examination of a small piece, the removal of which would not injure the material. The only difference found was that often the larger slag inclusions were broken, but this is also seen in pieces stretched to the same extent at ordinary temperatures.

G. B. W.

A list of the users of the Rennerfelt electric furnace, as given out by the Aktiebolaget Electriska Ugner of Stockholm, Sweden, controller of the furnace, shows 18 installations, 13 of which are in Sweden, 3 in England and 2 in Russia. These represent a total capacity of 18,050 kilograms. They are largely employed in producing steel castings, though one company also uses the furnace for tool steel and manganese steel. Another employs it for the refining of fluid steel charges. The furnace was described in *The Iron Age*, January 15, 1914.

Severe Test of Mayari Steel Chisel

The accompanying illustration depicts an interesting demonstration of the qualities of Mayari steel in which the results obtained could not have been exceeded with a high grade of tool steel. A hand-forged chisel, $\frac{5}{8}$ in. square and 7 in. in length, with a tapered point, was driven through a piece of 2-in. soft open-hearth steel bar. The chisel was

Chisel Made of Mayari Steel Which Was Driven With Sledge Hammer Through a 2-in. Block of Soft Steel

made from cropped ends of Mayari steel that ran about 0.34 per cent. carbon and was supplied by the Pennsylvania Steel Company, Steelton, Pa., to the D. Wilcox Mfg. Company, Mechanicsburg, Pa., to be used in making 6-in. links for the Lehigh & Wilkes-Barre Coal Company.

After being forged, the chisel was immersed in water, tempered and drawn to a light straw color. Most persons who have seen the specimen have expressed the opinion that the chisel, which completely penetrates the block of steel, was forced through by a steam hammer, but, as a matter of fact, a blacksmith held the tool with a pair of tongs while his helper drove it through with a sledge, the operation requiring about 15 min. After it had been forced through the block the chisel was in as perfect condition as before the blow. The steel which was furnished to the D. Wilcox Mfg. Company analyzed as follows in three different heats:

Carbon	0.305	0.335	0.340
Phosphorus	0.016	0.020	0.016
Manganese	0.770	0.660	0.500
Sulphur	0.028	0.029	0.036
Nickel	1.480	1.360	1.200
Chromium	0.560	0.590	0.430

It is interesting to note in connection with this test performance of Mayari steel that it is being supplied to the Frankford Arsenal, Philadelphia, for the manufacture of shrapnel cases and also will be used in the construction of the Memphis bridge over the Mississippi River.

Officers of the Bucyrus Forge & Machine Company, manufacturer of gas and gasoline engines at Bucyrus, Ohio, presented data at a recent meeting of stockholders showing that the plans of the company required some additional capital for their full development and it is understood that progress has been made in the matter. The company has recently booked a number of orders.

The effect of the war on iron mining in Spain has been to reduce the force of men engaged in that industry from a normal total of about 7000 to less than 3000.

PERSONAL

L. E. Strothman, manager of the pumping engine department of the Allis-Chalmers Mfg. Company, has been appointed chairman of the committee on meetings in Milwaukee of the American Society of Mechanical Engineers.

F. H. Peterman, for 32 years with the Garvin Machine Company, Spring and Varick streets, New York, has organized the Greenwich Machine & Tool Company, 417-421 Canal street, New York, of which he is president.

Thomas F. Fournier, former efficiency engineer of the American Locomotive Company and later district engineer of the Lamson Company, has been appointed chief engineer of the Becker Milling Machine Company, Hyde Park, Mass. He will also direct the sales policy of the company.

Dr. E. E. Pratt, chief of the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., was a guest of the Business Men's Club, Cincinnati, Ohio, at a noonday luncheon, November 24. In addressing those present he dwelt on the opportunity now presented for increasing our trade in South America. He also arranged with the foreign trade department of the Cincinnati Chamber of Commerce to make it a permanent branch office of the Department of Commerce.

F. D. Egan, electrical engineer for the Pittsburgh Crucible Steel Company, Midland, Pa., has also been made steam and hydraulic engineer. He has been connected with the company as electrical engineer for the past three years. In designing the electrical equipment for the plant he incorporated a number of radical changes from past steel works practice, notably that of underground transmission—alternating and direct current—and all lighting circuits. He is a member of the American Iron and Steel Institute, American Institute of Electrical Engineers, and Association of Iron and Steel Electrical Engineers.

C. E. McQuigg, assistant professor of metallurgy at Pennsylvania State College, gave an illustrated talk on "The Iron and Steel Industry" last week at Johnstown, Pa. He was introduced by D. M. Stackhouse, assistant superintendent of the Cambria Steel Company.

William Metcalf, president Braeburn Steel Company, Pittsburgh, has returned from a business trip to South America.

George E. Day, formerly manager of sales of the Youngstown Sheet & Tube Company, Youngstown, Ohio, has gone to California, where he will spend the winter. Mr. Day is still identified with the company in an advisory capacity and is also a large stockholder.

Edward Wooster, first vice-president National Tube Company, Pittsburgh, has gone to the Pacific coast on an extended business trip and will be away until about January 15.

Charles McKnight, president Carbon Steel Company, Pittsburgh, sailed for Europe, November 28, on a business trip.

Simon S. Martin, superintendent of the Maryland Steel Company, Sparrows Point, Baltimore, Md., has become the operating vice-president of the Rowe Calk Company, Hartford, Conn., in charge of all manufacturing operations.

The Mountain Ice Company last fall installed for power and light in its new natural ice harvesting and storage plant at Lake Hopatcong, N. J., a 375-kva. turbo-alternator set purchased from the Terry Steam Turbine Company, Hartford, Conn. It gave such excellent service that the ice company is putting a 219-kva. set in its plant at Gouldsboro, Pa. The Excelsior Needle Company, which is adding a new three-story building to its plant at Torrington, Conn., is also adding a 375-kva. Terry turbo-alternator set to its power plant.

Pittsburgh and Nearby Districts

The C. M. Neeld Construction Company, Oliver Building, Pittsburgh, has received a contract for a 1200-ft. concrete railroad viaduct at Wilkes-Barre, Pa., to cost about $90,000, and in which 400 tons of reinforcing steel bars will be used.

The Association of Iron and Steel Electrical Engineers will hold a meeting on Saturday evening, December 5, at the Seventh Avenue Hotel, Pittsburgh. An illustrated lecture is to be given by Wilfred Sykes on electrically driven reversing mills.

The Greenville Steel Car Company, Greenville, Pa., has begun work on an addition to its plant, 90 x 440 ft. It is being erected by the company's own force, and is for future requirements. F. L. Fay is general manager.

The directors of Crucible Steel Company of America, Pittsburgh, November 27, elected an executive committee consisting of Herbert DuPuy, chairman, C. C. Ramsey, James H. Park, H. S. Wilkinson, H. S. A. Stewart, John A. Sutton and H. D. W. English. Officers were elected as follows: Herbert DuPuy, chairman; C. C. Ramsey, president; John A. Sutton, first vice-president; J. W. Dougherty, second vice-president; G. W. Sargent, third vice-president; H. A. Brown, fourth vice-president; George A. Turville, treasurer, and Charles W. Rowlands, secretary.

The Bollinger-Andrews Construction Company, Pittsburgh, has received a contract for rebuilding an 870-ft. warehouse for the American Window Glass Company, Jeannette, Pa., to replace one destroyed by fire.

Z. T. K. Woo, superintendent of the Hanyang Iron & Steel Works, Hanyang, China, together with Dr. M. Oshima, Tokyo, Japan; P. Futjita of the same city; Thomas Bunt, London, England; Z. N. Kwank and T. C. Hsn, Hanyang, China, arrived in Pittsburgh on Monday, November 30. The party is making a tour of the industrial plants of this country to gather ideas to be used in the building of two blast furnaces and a battery of coke ovens, and possibly an open-hearth steel plant. While in Pittsburgh the party visited the Homestead and Edgar Thomson works of the Carnegie Steel Company and the South Side and Aliquippa works of the Jones & Laughlin Steel Company. A visit will also probably be made to the works of the Westinghouse Electric & Mfg. Company. It is likely that most of the equipment, if not all, for the blast furnaces will be placed in the United States, and it is said the company has practically decided to build by-product coke ovens of the Koppers type.

The monthly meeting of the Pittsburgh Foundrymen's Association will be held in the Fort Pitt Hotel on Monday evening, December 7. A. B. Reynders, director of production of the Westinghouse Electric & Mfg. Company, East Pittsburgh, will read a paper on "Castings in the Production of Electrical Apparatus." The association will vote on changing the meeting night from the first Monday to the third Monday of each month.

The Pittsburgh daily press has made much of the fact that the plant of the McKeesport Tin Plate Company, McKeesport, Pa., had resumed operations in full on Monday morning, November 30. The fact is that the plant, which contains 22 hot tin mills, shut down on Wednesday, November 25, the day before Thanksgiving, for the remainder of the week, with the full intention of starting up again on the following Monday. It is running full, but as yet has not orders ahead for many months, as stated.

The city of Pittsburgh will soon have direct trolley railroad connection with Beaver Falls, Pa., without change of cars. This is to be brought about by the building of a road 6½ miles long between Evans City and Beaver Falls, Pa., by the Pittsburgh, Harmony, New Castle & Butler Railroad Company. Freight as well as passenger service will be furnished.

At the meeting of the Engineers' Society of Western Pennsylvania, held in its rooms in the Oliver Building, Pittsburgh, on the evening of December 1, W. H.

Phillips, metallurgist of the R. D. Nuttall Company, read a paper on "Recent Developments in the Heat Treatment of Gearing." The paper dealt with the history of heat treatment, the great progress made in the past 10 years, the development of the railroad motor gear, the theory of hardening steel, critical temperatures, oil-treatment, pyrometers, testing instruments, case hardening, process treatment, etc.

It is reported that the works of the American Can Company at New Castle, Pa., has received an order for 15,000,000 cans for a large Chicago meat packing house.

On December 1 the Carnegie Steel Company was operating only 22 blast furnaces and had 37 idle. Late in November, Duquesne No. 5 went out for relining and repairs, and Ohio No. 2 at Youngstown was banked.

The Ligonier Valley Railroad Company, owned by the Mellon interests of Pittsburgh, whose line runs from Latrobe, Pa., on the main line of the Pennsylvania Railroad, to Ligonier, Pa., will build machine shops at Ligonier and will likely be in the market for considerable equipment of iron-working tools. Inquiries should be addressed to the purchasing agent of the Ligonier Valley Railroad Company, Ligonier, Pa.

The Cambria Steel Company has taken over the properties of the Penn-Mary Coal Company in Cambria and Clearfield Counties, which were formerly operated by the Pennsylvania Steel Company. The properties embrace about 18,000 acres of coal land. The Cambria Company has been increasing its supply of raw materials since the election of William H. Donner as president, two years ago.

The report that the Pittsburgh Steel Company, Frick Building, Pittsburgh, will build a $1,000,000 ore-concentrating plant near the shore of Rapid Lake, Crow Wing County, Minn., is officially denied.

A somewhat novel use of electric traveling cranes has been adopted by the Ford Motor Company for service in its assembling plants located at Cleveland, Cincinnati, Pittsburgh, Atlanta and Long Island City. The company recently placed an order with the Cleveland Crane & Engineering Company, Wickliffe, Ohio, for five cranes. They are for the purpose of conveying material received in bulk from freight cars located on the ground level to the various floors in each building, loading platforms in staggered location being placed on each floor and projecting below the crane runway. The hight of lift of these cranes varies from 45 to 90 ft.

It is reported that 28 steel foundries located between Chicago and the Atlantic coast are at present operating at an average capacity of only 35 per cent. In the Chester, Pa., district some of the steel foundries are running as low as 15 per cent. of capacity, while one foundry in Chester is said to be fairly busy on United States Government work.

Gas from the by-product coke-oven plant at Steelton, Pa., is reported to be used for illuminating purposes by the Harrisburg Gas Company, Harrisburg, Pa. It has only recently been turned on in certain portions of the city, but it is planned shortly to use it entirely for lighting. A readjustment of burners is necessary.

The structure of tool steel is the subject of an illustrated paper to be delivered by J. V. Emmons, metallurgical engineer of the Cleveland Twist Drill Company, Cleveland, at a meeting of the Cleveland Engineering Society on the evening of December 8.

Slag is largely used as railroad ballast in the district of Lorraine, Germany, about 250 miles being so ballasted. It is claimed to be far superior to gravel and equal to the best grade of rock.

The firm of Hegeler Brothers, Danville, Ill., has been reorganized and will be known in the future as the Hegeler Zinc Corporation.

OBITUARY

DOUGLAS S. MARTIN, of New York, for a time connected with the editorial staff of the Electrical World, died in France, recently, having been wounded in battle. He graduated as an electrical engineer from the Central Technical College, London, and coming to this country was editor of the General Electric Review. Some experience in electrical work on the Pacific coast followed and later the connection with the Electrical World. A short time ago he joined the British cavalry. He was a brother of Thomas C. Martin.

JOSEPH H. GLAUBER, general manager of the Glauber Brass Mfg. Company, Cleveland, Ohio, manufacturer of plumbers' brass goods, died in Seattle, Wash., November 27, from pneumonia, following an operation for appendicitis. He was taken ill while on a business and pleasure trip through the West. He was 43 years of age and leaves one brother, M. H. Glauber, treasurer of the company.

ALEXANDER HARVEY, secretary of the Detrick & Harvey Machine Company, Baltimore, Md., died November 25 at Johns Hopkins Hospital, from pneumonia. He was a native of Baltimore and was 57 years old and a graduate of Harvard. In 1884, with Jacob S. Detrick, he organized the company bearing his name. He leaves three sons and a daughter.

HUGH T. STEWART, Struthers, Ohio, one of the founders of the Struthers Iron Company, which built the Anna furnace in 1869, died November 25, aged 71 years. He was associated with Thomas Struthers, T. W. Kennedy and others, in the Struthers Iron Company which property was afterward taken over by the Struthers Furnace Company.

WILLIAM SPACKE, vice-president of the F. W. Spacke Machine Company, Indianapolis, died November 17, aged 35 years. He had been connected with the company since its formation.

Large Export Order for Chain

C. M. Power, general sales manager of the Standard Chain Company, Pittsburgh, Pa., has secured an order for chain and forgings to be used on a large order for artillery harness for the Allies, amounting to $525,000, which will require the output of a number of harness manufacturers of this country, who will thus be kept busy for four or five months. To make the required deliveries, the company has sublet a part of the work to the Oliver Iron & Steel Company, Pittsburgh Gage & Supply Company and Frick & Lindsay Company, all of Pittsburgh, and the John A. Roebling & Sons Company, Trenton, N. J. The Standard Chain Company expects to complete the order within three months. The order for harness is probably the largest ever placed in this country.

The allied Newport Rolling Mill Company and Andrews Steel Company, Newport, Ky., have lately received sufficient business to enable them to start up both plants on full time and with full forces. These companies have lately been operating at a reduced rate of production, but are now able to run to capacity for the remainder of the year.

The United States District Court, Buffalo, has named James E. Ferguson, president Ferguson Steel & Iron Company, as receiver for the Standard Structural Steel Company of that city, which recently went into bankruptcy.

George P. Hobbs, Wooster, Ohio, representing a client, is in the market for a complete equipment for manufacturing stamped and pieced tin ware or will consider partial equipment for a plant.

Italy's imports of iron and steel totaled 425,068 tons to July 1, 1914, as compared with 378,725 tons for the same period of 1913.

The Machinery Markets

Export business continues to be the salient feature of the machinery markets and those manufacturers who sell the machines which are wanted abroad are in many cases working to capacity. Inquiry from domestic sources is improving slowly and a few pleasing orders have been placed. In New York inquiries in general are showing more life, an electric motor company has been a purchaser and some good business is dependent on the placing of a shrapnel contract. Business in machine tools has been improving rapidly in New England, lathe makers have more than they can do and the demand for miscellaneous tools is widening. In Cleveland no large orders or lists are reported, but there is a fair volume of single tool-buying, general manufacturing conditions are better and the export movement is sustained. Engine lathes have the bulk of the export demand in Cincinnati, and domestic trade shows some improvement. Although the majority of the sales in Milwaukee are for export, domestic inquiry looks better and the general feeling is one of optimism. Plans for new plants and extensions are more in evidence in the Central South than they have been for several months. While the mine trade has fallen off in the Birmingham district, the lumber industry is showing more interest in equipment. In Texas the good demand for irrigation pumping machinery continues to be the feature. The St. Louis market is in the best condition since the beginning of the war. The machinery trade in the Pacific northwest has a slightly healthier tone, part of which is due to the opening of the Panama canal which has brought marine repair work to the Puget Sound shipyards.

New York

NEW YORK, December 2, 1914.

Inquiries from industrial sources are showing a little more life, but business traceable to the war continues to monopolize most of the activity. The Baldwin Locomotive Works has obtained an option on more than 70 small turret lathes in connection with a demand for these machines from Russia. Most of the machines exported heretofore have been of the heavier types. Orders for several machine tools have been placed by the Electro Dynamic Company, Bayonne, N. J., which received heavy orders for motors from the Bethlehem Steel Company. One of the machines purchased by this company was an 84-in. boring mill. A demand for engine lathes continues to come from abroad, an export company having received orders for about 50 in the last two days of last week. The sizes specified are 16, 18 and 24 in. A few scattered orders have been placed by railroads and some good buying by an automobile parts maker is anticipated.

Observant representatives of the trade have come to the opinion that most of the orders for war materials have been and will continue to be placed abroad. In regard to the much talked-of shrapnel business, disappointment is felt because of the delay in placing orders. Every few days the name of another company is mentioned as figuring on making shrapnel. Steel companies, automobile truck makers, air-brake manufacturers, electrical companies and machine shops have been mentioned as eager to make the shells, though in one case an auto truck maker dropped the subject after investigation. It now looks as if two manufacturers of air brakes would work together on a pending contract. Orders for machine tools are contingent on the shrapnel being ordered, and as a result some manufacturers of tools have had their stock entirely tied up for a few days by options. They are not now so ready to give options.

The Locomobile Company of America has just placed orders for several thousand dollars' worth of machine tools for its plant at Bridgeport, Conn.

The Sheffield Wire Rope Company, Ltd., Darnell, Sheffield, England, is in the market for machinery for making wire chains and other small wire goods other than staples and nails.

The National Sash & Door Company has removed its factory and offices from New Lots and Hopkinson avenues, Brooklyn, to 137-139 Bayard street, Brooklyn, N. Y., where it will continue the manufacture of fire doors, etc.

J. W. Beardsley's Sons, 474 Greenwich street, New York, manufacturers of shredded fish, etc., plan to use motor-driven equipment in their new plant at 710 Frelinghuysen avenue, Newark, N. J. The factory is four stories, 125 x 550 ft.

The Buffalo Lounge Company, 567 Exchange street, Buffalo, is building a four-story brick addition to its factory at a cost of about $10,000.

The Greenwich Machine & Tool Company has been incorporated with a capital stock of $10,000 by F. H. Peterman and others, and is installing a machine shop in the top loft at 417 to 421 Canal street, New York, where it will do a general machine business, build special and experimental machinery, and manufacture machine parts in quantity. Almost all of the machinery equipment has been purchased. F. H. Peterman is president; W. E. Rankin, treasurer, and W. E. Blackledge, secretary.

The Leindorf Electric Light Company, Candler Building, New York City, has been incorporated by E. Leindorf, H. L. Trisch and J. and G. G. Katz, with a capital stock of $25,000 to manufacture a patented electric lamp. It proposes to build a factory and will require various types of machinery for spinning and turning brads, and for making dies and tools. E. Leindorf is president, and B. A. Turcot is consulting engineer.

The Thatcher Mfg. Company, Elmira, manufacturer of milk bottles, etc., is enlarging its plant at Grand Central avenue, near Eldridge Park, at a cost of over $150,000. Construction contracts are being placed. F. E. Baldwin is president.

The Century Iron Works, 629 Concord avenue, Bronx, New York, is in the market for a second-hand swing-frame emery grinder. John Ment is in charge.

L. H. Pounds, president of the borough of Brooklyn, N. Y., will receive bids until 11 a.m., December 9, for a pumping station and equipment.

The plant of the Brooklyn Cooperage Company, Tupper Lake, N. Y., was destroyed by fire November 11 with a loss of $100,000. Plans for rebuilding are in progress. The main offices of the company are at 117 Wall street, New York.

Plans are under way for the rebuilding of the plant of the Geneva Brewing Company, Geneva, N. Y., which was destroyed by fire recently with a loss of $175,000.

Plans have been completed for a factory to be erected by the Premier Briar Pipe Company, Union, N. Y., to cost approximately $30,000.

The trustees of the village of Fredonia, N. Y., have purchased a site of five acres at Temple street and Canadaway Creek, on which a sewage disposal plant is to be erected. Frederick W. Wing, Buffalo, has completed plans.

The Barden & Robinson Basket Company, Penn Yan, N. Y., will erect a factory to cost about $50,000, complete.

Plans are being prepared for a three-story addition to be made to the plant of the Crescent Tool Company, Jamestown, N. Y., at an estimated expenditure of $48,000.

The Indian Splint Company, Rochester, N. Y., recently organized, will build a furniture factory to cost with equipment about $75,000. S. C. Langslow, 241 Alexander street, Rochester, is president.

A certificate of incorporation of the Island Slag Company, Buffalo, has been issued, showing a capitalization of $60,000. The company will manufacture, mine, quarry and deal in crushed slag, blast furnace slag and their by-products, cement, road building materials, etc. T. H. Wickwire, Jr., Buffalo, George G. France, William G. France, Lloyd H. Hawblitz and Howard E. Bair, Toledo, Ohio; R. Neel Van Winkler, Indianapolis, and Natcher R. France, Rockville, Ohio, are the directors. The probable location of the company's plant will be on Rattle Snake Island, Niagara River and the River Branch of the New York Central Railroad, adjoining the plant of the Wickwire Steel Company.

It is reported that the Niagara Sprayer Company, Park avenue, Middleport, N. Y., plans to install a system of conveyors and desires information regarding such equipment. Mr. Dosch is in charge

New England

BOSTON, MASS., December 1, 1914.

The machine-tool business is improving rapidly, taking the trade as a whole. The lathe builders are almost overwhelmed with orders and potential inquiries. They are taking on men as fast as first-rate mechanics can be found and absorbed into the organization. Business had been so absolutely bad that works were practically shut down—only skeleton working forces were left. Then orders began to pile in. Stocks have been wiped out in the sizes up to 18-in., and now heavier machines are in demand. Most of the business is for shipment abroad. Much of the remainder is for use for the same purpose, the manufacture of projectiles and guns of one sort or another. An occasional order shows an uplifting of the domestic market for other things than those connected with war.

The new business is not confined to lathes. It includes practically all classes of machines which produce cylindrical parts from metal. The automatics are in very great demand, from the large sizes down to screw machines. Important inquiries are out for grinding machines. Manufacturers of machinery for making guns are buying milling machines, shapers, a few planers and a general assortment of other tools that enter into general machine-shop equipment.

The manufacturers of firearms, who have received very large contracts, are adding to their plants on an extensive scale. The machinery people who specialize on equipment for the manufacture of small arms, notably the Pratt & Whitney Company, Hartford, Conn., can take no more business for delivery within two years or more. Therefore, there must be a distribution of orders for these classes of equipment over a broad field of machinery industry. Perhaps reports are exaggerated; but probably their basis is sound. Two great small arms manufacturers have, according to reports, each closed an order for 2000 army rifles a day. The equipment required by each is very large.

The machine-tool situation seems an anomaly; but it is not. Ordinarily this business is the first to feel depression, the last to respond to improved conditions; but war makes a difference, as was proved in the earlier stage of the Russian-Japanese conflict.

The Wallace Barnes Company, Bristol, Conn., manufacturer of springs, is preparing land upon which it is proposed to erect a rolling mill in the spring. The purpose is to purchase hot rolled material and convert it into spring steel. The full details of the addition are not completed.

The Hall Mfg. Company, Abington, Mass., will build an addition to its factory.

The new building of the N. D. Cass Company, Athol, Mass., manufacturer of toys, will be 60 x 180 ft., three stories. A new power plant is included in the extensions.

The Royal Equipment Company, Bridgeport, Conn., manufacturer of brakes and other automobile specialties, will erect an additional factory at its works on Railroad avenue, 60 x 90 ft., three stories and basement.

The Torrington Electric Light Company, Torrington, Conn., will build an addition to its power house, 16 x 42 ft., one story.

A. C. Kenneson, East Hartford, Conn., is planning the erection of a building for use as a ladder factory.

The City Council, Burlington, Vt., has authorized the issue of $50,000 of municipal electric light plant improvement bonds.

Philadelphia

PHILADELPHIA, PA., November 30, 1914.

The Builders' Guide reports the following details regarding the ammunition factory being erected at New Castle, Del., by the Bethlehem Steel Company, South Bethlehem, Pa.: Brick and concrete building, one and two stories; magazine, 12 x 22 ft.; charge plant, 36 x 80 ft.; office building, 32 x 45 ft.; power house, 80 x 96 ft.; four shops, 27 x 62 ft., 27 x 102 ft., 27 x 82 ft. and 27 x 102 ft., respectively. Bids are being taken by the company. Charles Lehr is chief engineer.

The W. O. Hickok Mfg. Company, Harrisburg, Pa., manufacturer of bookbinding and ruling machinery, etc., is having plans prepared by Day & Zimmerman, engineers, 611 Chestnut street, Philadelphia, for factory buildings. It will purchase new automatic metal-working and wood-working machinery, a complete foundry equipment, and fire-protection apparatus. Ross A. Hickok is secretary.

The Keystone Wire Cloth Company, Hanover, Pa., has doubled the capacity of its plant. B. M. Frey is manager.

The New Jersey State Board of Health, Trenton, N. J., has approved revised plans for a sewage disposal plant for Avalon, N. J. The city will vote $33,000 of bonds to cover its construction. G. S. Smith is mayor.

The Bangor Casket Mfg. Company, Bangor, Pa., has started the construction of a factory of brick and concrete to cost about $25,000. It will have a floor area of 15,000 sq. ft., and will be ready for operation February 1, 1915. B. F. Miller is general manager.

The Maryland Brass & Metal Company, Federal street and Guilford avenue, Baltimore, Md., is building a two-story addition, 46 x 78 ft., to its factory, at a cost of about $5000. Callis & Callis, 2520 Kennedy avenue, Baltimore, are the architects.

Chicago

CHICAGO, ILL., November 30, 1914.

While the situation with many manufacturers of machine tools has been greatly relieved through the placing of export business, and machine-tool factories are among the busiest of our industries, dealers in this market are finding but little inquiry. There is a degree of activity in second-hand equipment but unfortunately it is largely concerned with sales by machine-shop operators rather than purchases. The railroad situation is extremely dull and as yet railroad managements are committing themselves to no programme of shop improvement for the coming year.

M. Goldschmidt & Co., Chicago, have been incorporated with a capital stock of $2500 to manufacture electrical motors, appliances, etc. The incorporators are Alexander and Max Goldschmidt and Julius Phillips.

Charles H. Kellerman, operating a foundry at 1338 Sedgewick avenue, Chicago, has taken out a permit for a four-story factory, 100 x 140 ft., to be erected at 461 West Erie street.

J. J. Kern, Chicago, is building a two-story brick factory at 2910 Indiana avenue, to be 40 x 110 ft., and to cost $16,000.

The McKinney Tractor Company, Belleville, Ill., has been incorporated with a capital stock of $200,000 by Edward Abend, G. A. Becker and H. E. Kniephamp.

The board of trustees of East Peoria, Ill., has passed an ordinance providing for a new waterworks system to cost approximately $33,000.

The Southern Railway, 1300 Pennsylvania avenue, Washington, D. C., is asking for bids for the construction of an 18-stall roundhouse, shops and other buildings. The improvements also include a 90-ft. turntable, modern coal and cinder handling plant, oil house, office building, etc., and the construction of repair yard tracks and other track work.

The car repair shops and roundhouses of the Baltimore & Ohio Railroad at East Chicago, Ind., were completely destroyed by fire, together with their contents, including machinery, new passenger coaches, tenders, cars and engines being repaired.

The Perfection Coil Spring Company, Jackson, Mich., has been incorporated with a capital stock of $20,000, to manufacture cushion springs for automobiles and other vehicles, bed springs and coil springs for upholstering furniture. Frederick J. Foill, Bartol T. Sims, Raymond W. Foill and Wilfred G. Lane are the incorporators.

The Ford Garage Company, Bloomington, Ill., has been incorporated with a capital stock of $15,000 by Frank D. Hackett, J. C. Harvey, and others, and will equip a repair shop and garage.

The plant of the Roberts Cotton Seed Oil Company, Cairo, Ill., has been burned with a loss of $100,000. The equipment will be replaced at once.

The Hager & Rank Automobile Company, Moline, Ill., has been incorporated with a capital stock of $15,000 by George Hager, Axel Sooling and R. W. Rank, and will equip a repair shop with lathes, drill presses, etc.

Bids are to be let for the new $30,000 ice plant of Schalk Brothers, Anderson, Ind., which was destroyed by fire a few weeks ago.

Milwaukee

MILWAUKEE, WIS., November 30, 1914.

As November comes to a close all signs are in the direction of a decided business revival before the end of the year. It has been a long time since so cheerful a feeling has existed. Transactions the past week were of greater volume than for an entire month earlier in the year. The situation is particularly gratifying because it means re-employment for hundreds of men who have been idle or working on greatly reduced schedules for eight to 12 months. Inquiries for prime movers have been resumed after a long lapse; but builders are not banking on actual purchases before 30 to 60 days, if that early. Domestic inquiry on machine tools is improving; but sales are only a bit better, and the bulk of the transactions are on export account. Manufacturers of farm equipment,

who have been probably more fortunate than other industries, are maintaining their rapid progress. Reports throughout the State show that the turn for the better cannot be questioned.

The Phyar Extinguisher Company, Milwaukee, has been incorporated with a capital stock of $100,000 by Rudolph Pfeil, William E. Schultz and Herman Zottel to manufacture fire extinguishers.

The B. J. Johnson Soap Company, Fourth and Fowler streets, Milwaukee, Wis., is planning to add four additional floors to its factory, to be completed by next spring.

The Independent Electric Mfg. Company, 886 Greenbush street, Milwaukee, has changed its corporate style to the Industrial Controller Company, and increased its capital stock from $35,000 to $100,000. It specializes in controlling devices. Charles G. Welch is president and F. W. Magin, general manager.

The large brick and frame foundry and machine shop of the defunct Wambold Mfg. Company, Milwaukee, part of which is occupied by the American Metal Products Company as a brass foundry, was badly damaged by fire November 28. The latter company, which suffered a loss of about $20,000, intends to continue business in another location. Peter J. Weber is president.

The F. R. Dengel Mfg. Company, 336 Fourth street, Milwaukee, manufacturer of plumbers' and steamfitters' supplies, has increased its capital stock from $100,000 to $150,000.

The Sheboygan Railway & Electric Company, Sheboygan, Wis., is considering the extension of its interurban lines next spring from Elkhart Lake to Chilton, Wis. Edward Hammett is general manager.

The Standard Electric Company, Racine, Wis., has increased its capital stock from $25,000 to $100,000.

A new firm which will specialize in structural steel erection has been organized at Milwaukee by Frank F. Jackson, vice-president of the Lakeside Bridge & Steel Company, Milwaukee, and O. G. Henderson, a well-known erector. Mr. Jackson's connection with the Lakeside Company remains unchanged. The firm is styled Jackson & Henderson.

The plant of the Paramount Metal Form Drying Company, manufacturer of drying systems for knitting and woolen mills, Beaver Dam., Wis., was badly damaged by fire last week.

Articles of incorporation have been filed by the Paragon Oil & Supply Company, Oshkosh, Wis. The capital stock is $10,000. E. L. Thompson, T. F. Coffee and Erle Thompson are the incorporators.

The board of school directors, Milwaukee, is preparing for additions to several schools costing an aggregate of $175,000 and requires boilers, etc. Frank M. Harbach is secretary.

The Milwaukee Belting & Supply Company, Milwaukee, has been incorporated with a capital stock of $10,000 by Louis H. Koenig and F. P. Brownell.

The University of Wisconsin, Madison, will take bids until December 15 for the entire construction of building and laboratory for the department of physics, to cost $250,000. Plans have been prepared by Arthur Peabody, university architect. M. E. McCaffrey is secretary.

The Janesville Electric Company, Janesville, Wis., has increased its capital stock from $100,000 to $300,000.

The Racine Carriage Company, Racine, Wis., has been organized with $25,000 capital stock by W. H. Richardson, J. O. Kennedy and J. C. Lund.

Cleveland

CLEVELAND, OHIO, November 30, 1914.

No large orders or new lists of any size are reported; but a fair volume of single tool business, with a better run of inquiry, is reported. The machine-tool business generally in November shows quite an improvement over October. Builders of machines, however, whose business has not been affected directly or indirectly by the war, report little improvement. Foreign orders are still coming out, and while no further large export orders have been placed, the aggregate of foreign buying in small lots is considered larger than the normal volume of export business before the war began. It is stated that the Willys-Overland Company, Toledo, which will shortly begin the erection of large additions to its plant, will purchase a round lot of machine-tool equipment. Conditions in general manufacturing lines are looking up somewhat. The domestic demand for twist drills has improved and some good foreign business has come to Cleveland makers.

The Nonpareil Mfg. Company is establishing a plant on East Seventy-eighth street, Cleveland, near the plant of the Champion Machine & Forging Company. It is a new company and is not yet ready to announce its line of products. It has purchased some machine shop equipment and will buy a few more standard tools. H. O. Connelly is manager.

Manning, Maxwell & Moore moved their Cleveland office December 1 from 1462 Ontario street to 518 Leader-News Building. The change in location followed the decision of this firm to discontinue its display room, which it has been maintaining in connection with its offices on Ontario street. Its trade in this territory will be supplied largely from its Chicago and Jersey City warehouses.

The Hunt & Dorman Mfg. Company, Cleveland, will build a plant on East Twenty-fourth street, between Payne and Superior avenues. It will be a two-story concrete building, of mill construction, and will provide 22,000 sq. ft. of floor space. The company manufactures sheet metal stampings and dies. Plans for the building have been prepared by Ernest McGeorge, engineer, Leader-News Building, who will place the contract for a low-pressure heating system.

The Cleveland Builders' Supply Company has acquired a 6-acre site on the Belt Line Railroad, adjoining the plant of the Chandler Motor Car Company, and will erect a concrete warehouse. Some electrically-driven equipment will be installed.

The Federal Foundry Supply Company, Cleveland, has increased its capital stock from $50,000 to $75,000.

The Toledo Metal Mfg. Company, Toledo, Ohio, has been incorporated with a capital stock of $60,000 and will take over the plant of the Toledo Tank & Boiler Company and make some extensions. It will manufacture stacks, storage outfits and tanks. Joseph F. Grosswiller and others are interested.

The Victor Screw Company, Toledo, has been incorporated with a capital stock of $5000 by John N. Detzer, F. E. Edmonds, Frank A. Carabin, and others.

The Herbrand Company, Fremont, Ohio, has begun the erection of three additions to its plant which will include a power house, a tempering room and a heating room.

The Wooden Ventilator Company, East Palestine, Ohio, of which Thomas Padgett is proprietor, will erect a new two-story brick factory, 48 x 100 ft.

The McClurg Rubber Company, Coshocton, Ohio, has been organized with a capital stock of $250,000 by J. S. McClurg, Columbus, and others, to take over the plant of the S. & M. Rubber Company, Coshocton. Plans for reorganizing the company have been under way for some time.

Cincinnati

CINCINNATI, OHIO, November 30, 1914.

Export orders for lathes continue to come in, and most lathe builders in this territory are running on full time. In some instances night work has to be resorted to in order to get out shipments on time. Foreign orders for other kinds of machine tools are light in comparison with those placed for lathes; but some business in milling machines has been closed lately, and it is understood a number of inquiries are in hand. Shipments to Russia are said to be going via the Pacific coast route, and reshipped to destination over the Siberian Railroad. This doubtless accounts for imperative instructions given on some orders to rush shipments forward as much as possible, as under the best possible conditions it is estimated that it would take over 60 days for the machines to reach their destination.

There is some improvement in domestic business, but actual orders received are principally from the East and Central West; nothing is reported lately from the Pacific coast trade. One local manufacturer was surprised last week to receive a telegram from a railroad in the South asking how soon shipment could be made of a large machine tool. The reported purchase of 2000 tons of axle billets by the Louisville & Nashville Railroad indicates that this company's car shops will be busy at an early date.

The American Tool Works Company, Cincinnati, has lately received enough business to warrant it putting on a full day force, part of which is working over time. Two of this company's departments are operating all-night shifts. While most of its orders are from abroad, it reports quite an improvement in domestic business, mostly from territory east of Cincinnati.

The Thurber-Browning Company, Andrews Building, Cincinnati, has leased the former plant of the Ideal Steel Wheel Company, Winton place, Cincinnati, and will use it for storage purposes. This company recently received a large sewer contract. All equipment has been purchased.

W. B. George, 7 Linden avenue, Ft. Thomas, Ky., is interested in a proposed company for starting a foundry to make a specialty of small gray-iron castings. No definite plans have yet been given out.

The Hooven, Owens, Rentschler Company, Hamilton, Ohio, has lately received an order for an extra large pump and air compressor to be installed in the municipal waterworks plant at Marion, Ohio.

The Carroll-Jamison Machine Tool Company, Batavia, Ohio, is building an addition to its plant that will be 20 x 134 ft., one story, of mill construction.

Herman, Peters & Brown, architects, Dayton, Ohio, are preparing plans for A. G. Feight, Dayton, for a four-story concrete building, 85 x 150 ft., that will be used for housing small manufacturing plants.

The Crescent Machine & Tool Company, Dayton, Ohio, is the new name for the firm formerly known as the New Machine & Tool Company. It manufactures small tools and dies. W. L. Dimler, J. H. Mayhew and O. D. Brown compose the partnership.

Lewis L. Wehiner, Dayton, Ohio, owner of a brewery at Wellston, Ohio, contemplates adding to the refrigerating equipment of the plant at an early date.

The Hamilton Paper Mills Company, Dayton, Ohio, has been incorporated with $30,000 capital stock by M. C. Stern and others.

The Ford Die, Tool & Machine Company, Columbus, Ohio, has been incorporated with $10,000 capital stock by S. S. Ford and others. Nothing is yet known as to manufacturing plans.

Blanchester, Ohio, has voted a bond issue of $5000 for the purpose of enlarging its lighting plant.

The Central South

LOUISVILLE, KY., November 30, 1914.

A decided speeding up of industrial interests in this section has been noted. Numerous concerns plan expansions and improvements, in addition to the establishment of new factories by other companies just entering business. Prospects and inquiries are better than for many months, and while current business is relatively small, machinery houses are confident that around the first of the year trade will be greatly increased. Business in this immediate vicinity is considerably better than further South, as the cotton section is still suffering from depression. Power equipment, especially, electrical apparatus, is in better demand, and wood-working machinery is also selling well.

The Kentucky Revivo Battery Company, Louisville, has been incorporated with $200,000 capital stock to manufacture a dry battery, for which it has territory rights. R. M. Kelly, Jr., is president and in charge of purchases, including an engine and generator. A building will be leased.

The Louisville Silo & Tank Company, which has increased its capital stock from $10,000 to $60,000, has plans for a factory, 90 x 100 ft., to be erected at Twentieth and High streets. Motor-driven wood-working equipment will be installed. A. W. Bryant is president. Construction work will begin January 1.

The plant of the bankrupt Bradford Worsted Spinning Company, Louisville, will be sold at auction December 14. The power equipment includes three 150-hp. boilers, one 750-hp. Corliss engine, one 75-hp. Ideal engine, one 40-hp. Skinner engine, one 30-kw. generator, etc.

The Southern Rubber Products Company, Louisville, will equip a plant at 606-612 Underhill street. The cost of power and special equipment will be $20,000. Motors aggregating 100 hp. will be needed. A. F. Wolke is president and buyer.

The Grocers' Biscuit Company, Louisville, will purchase motors.

Plans for the waterworks plant for Sebree, Ky., have been drawn by William Barrows, Sebree. The estimated cost is $15,000. Vernon Sullinger is city clerk.

D. M. Rhea, superintendent of waterworks, Morganfield, Ky., will receive bids until December 17, for two 400-gal. compound duplex pumps.

The Elkhorn Lumber Company, Shelby Gap, Ky., is reported to have plans for a sawmill.

Lewis Hagan, Winchester, Ky., plans to have a patented gas radiator manufactured by contract. A plant may be installed later on.

Fred Hunt has purchased the Somerset Repair & Machine Shop, Somerset, Ky., from H. L. Baisley.

The Kentucky Utilities Company, Lexington, Ky., has filed a mortgage for $3,000,000 in favor of the Illinois Trust & Savings Bank, Chicago. The proceeds of the loan are to be used in extensive improvements.

J. W. Hood has purchased the electric light plant at Scottsville, Ky., from Mays & Schlinker.

Bethel College, Russellville, Ky., will install a semi-Diesel type 10-hp. gasoline engine with a belt-driven direct current dynamo for lighting purposes. H. G. Brownell is president.

The mine tipple of Shelby Girsh, Central City, Ky., located at Island, Ky., was burned recently with a loss of $35,000. The equipment is to be replaced.

Central University, Danville, Ky., will require a steam heating plant.

A. L. Carpenter, Uniontown, Ky., is reported to be planning improvements in his electric light plant.

The Pope & Caywood Lumber Company, Harlan, Ky., will equip a machine shop now under construction.

The Tell City Furniture Company, Tell City, Ind., will purchase equipment for a four-story addition to its factory, now under construction.

Madison, Ind., is reported to have plans for the installation of deep well pumps.

The board of commerce, Benton, Tenn., has information regarding plans for the establishment of electric light and water plants there. Address J. L. Brewer.

It is reported that the Novelty Wood Turning Company, Knoxville, Tenn., will equip a plant at a cost of $5000. A. S. Roberts and Nathan Blum are among the owners.

The Chattanooga Gas & Coal Products Company, Chattanooga, Tenn., of which Lewis T. Wolle is president, will construct an emergency water system for use in connection with its new plant, for which contracts have been awarded.

Numerous traction companies are being organized in Nashville, Tenn., for the purpose of building interurban lines into Tennessee and Kentucky. Among them are the following: Middle Tennessee Interurban Railroad, Franklin, Tenn., to Huntsville, Ala.; Tennessee & Kentucky Interurban Railroad Company, Nashville to Adairville, Ky.; Cumberland Valley Interurban Railway Company, Lebanon, Tenn., to Sparta, Tenn.; Nashville & Murfreesboro Interurban Railway, Davidson to Rutherford counties. H. H. Mayberry, Nashville, is interested in most of the companies.

Birmingham

BIRMINGHAM, ALA., November 30, 1914.

While the disposition of the farmer to hold his cotton off the market has demonstrated a better condition in agricultural districts than was thought in the beginning of the season the absence of marketing results in a failure to pay debts; hence, although there is much more optimism the volume of trade does not expand in a satisfactory manner. Sawmills show a disposition to begin negotiations, but are slow to buy. The mine trade has fallen off. General opinion is that recovery has set in; but that it will come by small steps.

The Decatur Fertilizer Company, Decatur, Ala., which has increased its capital stock from $10,000 to $30,000, contemplates improvements.

W. M. Deems, Dayton, Ohio, is reported as about to establish a plant at Mobile for manufacturing vitrified brick.

The Florence Ice & Coal Company, Florence, Ala., of which H. J. Moore is general manager, will enlarge its plant.

Armour & Co., Mobile, Ala., will rebuild their plant damaged by fire.

The Darien Mfg. Company, Darien, Ga., has been incorporated with a capital stock of $40,000 by James E. Thomas, Robert J. Downey, and others, and plans to establish an ice factory, an electric lighting plant, etc.

Edward Miranda, Bunnell, Fla., will establish an ice plant.

H. L. Gray, Raleigh, Fla., will establish a lumber plant in place of the one recently burned at a loss of $10,000.

The Dade City Broom Company, Dade City, Fla., will establish a broom factory. E. E. Kinkle is president.

The Tampa Brush Company, Tampa, Fla., has been incorporated with a capital stock of $15,000 by Harry Lieman, Abraham Maas, George D. Hauser, and others, to manufacture brushes and wood novelties.

Texas

AUSTIN, TEXAS, November 28, 1914.

Bad weather has interfered to some extent with the machinery and tool trade. The demand for irrigation pumping machinery continues good. Cotton is moving more freely than a week ago and more money is being placed in circulation.

The Driscoll Pipe Line Company, Groesbeck, which has a capital stock of $200,000, will lay a natural gas pipe line from the Mexia field to Corsicana and intermediate towns. It also plans a pipe line from the Mexia wells to Austin, a distance of about 150 miles. The incorporators of the company are Timothy J. Driscoll, Indianapolis; Lewis E. Elliott and Percy A. Little, Buffalo, N. Y., and Cornelius T. Herring, Amarillo, Texas.

Charles R. Tips will install a pumping plant on the Frio River for the town of Three Rivers.

A. W. Jones and E. W. Jones, Del Rio, will install a pumping plant to irrigate 150 acres of land.

U. C. Fickling, Llano, will build a broom factory.

The New Braunfels Brewing Company, New Braunfels, will install additional machinery and enlarge the capacity of its brewery.

John Borradalle, Santa Fé, N. M., and associates, are preparing to construct a hydroelectric plant in White Rock Canyon, 15 miles from Santa Fé. Application for authority has been approved by James A. French, state engineer.

A municipal waterworks plant and distributing system will be constructed at Aspermont at a cost of $18,000.

Henry M. Wallace, president Corpus Christi Gas Company, Corpus Christi, plans to lay a natural gas pipe line from the White Point field, near Sinton, to San Antonio, 150 miles. It is estimated that the project involves the expenditure of about $1,500,000.

St. Louis

ST. LOUIS, MO., November 30, 1914.

The machine-tool market is in better tone at the present time than since the opening of the European war. With the Reserve Bank system settling into running order, the money market is becoming rapidly easier and more disposition to plan for the future is being shown. Indications point to increased activity immediately after the turn of the year. Enterprises now under consideration are expected to result in demand for equipment by that time. From nearby cotton sections come reports of a more stable feeling and of the movement of cotton, which, while not profitable, is releasing money needed for current operations. Collections are reported satisfactory in all sections except the cotton area and there they are much improved. Tool inquiries actually received are running about 60 per cent. of normal and are confined to immediate needs and necessary replacements. Second hand tools are in very light request.

The George R. Richardson Machinery Company, St. Louis, has been incorporated with a capital stock of $50,000 by W. G. Meyers, H. J. Mann and K. B. Walsh and will engage in business at once.

The mill, boiler house and yards of the Henry Quellmalz Lumber & Mfg. Company, St. Louis, which have been burned with a loss of about $25,000, will be replaced.

The Modern Auto Repair & Construction Company, 4601 Olive street, St. Louis, of which Charles Less is manager, will install lathes, drill presses, etc.

The Laclede Gas Light Company, St. Louis, will erect a station power plant and will install equipment to cost about $25,000.

The Missouri Valley Light & Power Company, Eldorado Springs, Mo., will install one 30-kw. 2300-volt steam-driven generating unit to be operated parallel with a Corliss engine. D. E. Bent is in charge.

The Citizens Light, Water & Power Company, Hale, Mo., will equip a boiler house and install two boilers, engines, generating equipment, etc.

The Hermann-Sanford Saddlery Company, Springfield, Mo., will not rebuild its plant, recently destroyed by fire. It has leased a factory. F. C. Hermann is president.

The Burdette Mfg. Company, Kansas City, Mo., has increased its capital stock from $75,000 to $100,000 and will enlarge its manufacturing facilities.

Gravette, Ark., will install an electric light and power plant and is in the market for boilers, engines, generators, etc. E. H. Crayton should be addressed.

The Bentonville Ice & Cold Storage Company's plant at Bentonville, Ark., has been burned with a loss of $15,000. The engines, condensers and other machinery were completely ruined.

The Southwestern Cities Electric Company, Lawton, Okla., John C. Keys, president, has plans for the installation of a second 250-hp. Diesel engine and will receive bids shortly.

Yale, Okla., has plans for the installation of an electric light plant, the specifications calling for a 75-kw. direct-connected unit.

The Acme Pipe & Foundry Company, Oklahoma City, Okla., has been incorporated with a capital stock of $13,000 by C. H. Fleet, M. K. Wright and W. S. Nelson and will equip a machine shop.

The Sam-O-Set Oil Company, Ardmore, Okla., recently incorporated by Robert Watchorn, Los Angeles, Cal., and others, with $5,000,000 capital stock, has plans for the construction of a pipe line from Healdton and Cushing, Okla., to the gulf, with necessary pumping equipment, etc.

The Silver Crow Oil & Refining Company, Stillwater, Okla., has been incorporated with a capital stock of $50,000 by V. B. Von Tacky, Robert A. Lowry and J. A. Clingenpeel and will equip a refinery.

The Jeffery Motor Company, Tulsa, Okla., has been incorporated with a capital stock of $12,000 by C. B. Adams, F. E. Adams and L. L. Giacomini, and will install a repair department including lathes, drill presses, etc.

The N. S. Sherman Iron & Machine Works, Oklahoma City, Okla., will extend the waterworks equipment at Cushing, Okla., the work involving about $20,000 and also construct a waterworks plant at Morris, Okla., to cost about $37,500. The Benham Engineering Company, Oklahoma City, is in charge.

M. M. Ullman, secretary of the board of trustees of the Natchez Hospital, Natchez, Miss., is receiving bids for a boiler plant and heating and ventilating equipment.

The saw and shingle mill of Lee H. Bird, Oma, Miss., is reported burned with a loss of $3500 on machinery alone.

The Laurel Light & Railway Company, Laurel, Miss., will install a turbo-generator set with condenser and one 300-kw. rotary converter for street railway service.

H. Converse, operating the municipal electric light plant at Crystal Springs, Miss., has plans for the installation of two crude oil engine driven generating sets, one of 12½ kw. and the other 75 kw., both of 125 volts, direct current, direct connected type.

C. A. Rees, Shreveport, La., will install at West Monroe, La., an electric light plant, complete, and add equipment to the waterworks plant at a total cost of $16,000.

The Ozone Ice Company, Bogalusa, La., will install additional cold storage and ice-making machinery. M. K. Pearce is president.

The Pacific Northwest

PORTLAND, ORE., November 24, 1914.

The machinery trade shows a slightly healthier tone. While no great activity is to be expected at this season, the improvement in financial and shipping conditions promises well for the coming year. The Panama Canal, besides giving great assistance to the lumber industry, is bringing much marine repair work to north Pacific ports. More inquiries are appearing for mining equipment, both from the interior and from Alaska. In the grain districts there is an increasing demand for miscellaneous equipment, including numerous small orders for tools. Harbor work and other public improvements are still an important factor.

Tweeden & Marsh, Tacoma, Wash., have taken a contract for the construction of an electric suction dredge for the city of Tacoma, at $66,000.

The Weyerhauser Lumber & Timber Company, White Building, Seattle, contemplates the construction of a large lumber mill in Idaho.

The Non Slip Sidewalk Door Company, Spokane, has been incorporated with a capital stock of $60,000 by Frank O'Brien, Oscar M. Borg and David C. Coates, to manufacture a patent floor covering. A factory will be built in Spokane.

The Kenyon Killibug Company, Great Falls, Mont., recently incorporated by Clarence, Harry and Bery Kenyon, Louis Angert and A. J. Williamson, with a capital stock of $50,000, plans the erection of a chemical factory.

Plans for a beet sugar plant, which is estimated to cost $1,000,000, are being prepared for Hamilton, Mont., capitalists. Marcus Daly, Hamilton, is at the head of the movement, and has full information.

The contract for repairs to the steamer Santa Catalina has been awarded to the Willamette Iron & Steel Company, Portland, Ore. It includes the replacing of a large amount of machinery, and totals $300,000.

The lumber mill of A. M. Young, near Tyghe, Ore., was completely destroyed by fire recently, with a loss of about $10,000. It is reported that it will be rebuilt next spring.

The Electro Chemical Company, Tacoma, has been incorporated for $26,000, by Alfred E. and E. D. Goldsmith, A. D. and W. C. Eshelman, and J. H. Linton. Hugo Metzler, 401 Bernice Building, Tacoma, is attorney for the company.

The Highland Water Users' Association, Kennewick, Wash., has been organized with a paid-up stock of $40,000 by John Ross, W. B. Wuth, R. H. Nicholson, W. D. Craver and G. H. Taylor. John J. Ruskin is the attorney.

The Balboa Hydraulic Mining & Dredging Company, Seattle, has been incorporated for $500,000, by Harry Le Barr and C. B. Stone.

The Yaquina Bay Electric Company, Vancouver, Wash., has increased its capital stock from $20,000 to $40,000, and will use the additional capital for improvements to its plant. It is developing power sites near Yaquina, Ore. A. Welch is one of the principal stockholders.

The Bratlie-McClellan Shingle Mill Company, Ridgefield,

Ore., owned by John L. Bratlie and William McClelland, is enlarging the capacity of its electric light and power plant and is in the market for a new boiler and generating machinery.

Warrenton, Ore., has voted bonds in the sum of $150,000 for a water system.

The Underwater Current Motor Company, Spokane, recently organized and capitalized at $150,000 will soon begin the manufacture of water motors for use on farms for providing both light and power. An annual output of from $50,000 to $75,000 in value is planned. It will be affiliated with the Central Machine Works, Spokane.

Plans for the construction of a two-story reinforced concrete power house, 47 x 67 ft., to be built for the U. S. Government at The Narrows, Lake Washington Canal, Seattle, have been completed by architects Bebb & Gould, Denny Building. The structure will cost $55,000 exclusive of machinery. Bids for construction of the plant and for equipment will be received by Major Cavanaugh, U. S. Engineer Corps, Burke Building, Seattle, shortly.

Eastern Canada

TORONTO, ONT., November 30, 1914.

H. F. McAlpine, Glencoe, Ont., will purchase machinery for a general machine and auto repair shop.

Preparations are under way for the construction of a new elevator at Montreal, for the Harbor Commission.

A waterworks plant will be installed at Mimico, Ont., at a cost of $125,000.

Tenders will be called for four pumps to be used in connection with the new 42-in. intake pipe at Ottawa, Ont., waterworks. The pumps will cost $6000 each. R. L. Haycock is city engineer.

A new boiler will be installed in the plant of the Guelph Steam Laundry Company, Guelph, Ont., at a cost of $700.

The Provincial Government has authorized the Town Council, Aylmer, Que., to construct a filtration plant. Mr. Le Blanc is the engineer.

The Arctic Ice Company, Renaud street, Quebec, will construct an ice plant. J. L. Lachance, St. Paul street, is manager.

The Bartlett Automobile Company, Stratford, Ont., of which C. Bartlett is manager, has had plans drawn for a factory to cost, equipped, about $50,000.

The City Council, London, Ont., has authorized the purchase of machinery for the Springbank pumping station, including two water wheels, turbine pumps, synchronous motors, etc. H. J. Glaubitz is city engineer.

The Canadian Lippard-Stewart Motor Car Company, Ltd., Ottawa, Ont., has been incorporated by James S. Innis, Toronto; Thomas A. Burgess and Louis Cote, Ottawa, and others, with a capital stock of $50,000 to manufacture motor vehicles, machinery, etc.

The Aztec Oil & Asphalt Refining Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of $2,000,000 by Frederick H. Markey, W. W. Skinner, attorneys, Montreal; George G. Hyde, and others, to manufacture tar, paint, asphaltum, etc.

The Sandwich Bay Pulp & Lumber Company, Ltd., Montreal, has been incorporated with a capital stock of $2,000,000 by Aurele Bernier, Oscar Beauchamp, and others, to manufacture pulp paper, etc.

The Canadian Match Company's factory, at Drummondville, Que., has been burned. A large amount of machinery was destroyed.

Western Canada

WINNIPEG, MAN., November 28, 1914.

Machinery houses find the demand rather quiet. Reports indicate that the volume of business this month has been smaller than in November, 1913. The total machinery business in this section since the first of the year is probably 30 or 40 per cent. smaller than for the same 11 months last year. It is futile to speculate on future trade in western Canada until the end of the war.

The City Council, Regina, Sask., will install machinery in the power house. Storey & Van Egmond, McCallum-Hill Building, Regina, are the engineers.

Extensions will be made to the waterworks plant and system at Cranbrook, B. C., at a cost of $100,000.

The Ellison Milling Company, McGrath, Alberta, will install a generator in its plant to supply the town with electricity.

Work will be completed as soon as possible on the lumber mill for the Alberta & Great Waterway Railway Company, Edmonton, Alberta. Machinery capable of turning out 200,000 ft. of lumber per day will be installed.

The Pacific Mills, Vancouver, B. C., has been incorporated with a capital stock of $9,500,000 to take over the Ocean Falls Pulp & Paper Company, recently in financial difficulties. The plant will be reopened.

The directors of the Hudson Bay, Peace River & Pacific Railway Company are contemplating the erection of shops at Transcona, Man.

The Globe Pump Company, Green Bay, Wis., will erect a pump manufacturing plant at Winnipeg, Man. R. I. Byington is manager.

W. W. McNeely, manager of the Alberta Linseed Mfg. Company, Medicine Hat, Alberta, announces that it will rebuild its plant recently destroyed by fire, with a loss of $20,000.

The Easterbrook Milling Company, Richmond, B. C., capitalized at $30,000, will erect a flour and feed mill.

James E. Ellison, Cardston, Alberta, president of the Ellison Milling Company, announces the purchase of the Cardston Milling Company's plant. The plant, which now has a capacity of 300 bbl. per day, will be enlarged.

A factory building has been completed for the Saskatchewan Iron & Bridge Works, Moose Jaw, Sask., but no machinery has yet been installed. George Harrison, 8 Connaught street, is managing director.

Plans are being prepared for the erection of a power plant at New Denver, B. C., to replace one recently destroyed by fire.

Trade Publications

Leather Packings.—Watson-Stillman Company, 190 Fulton street, New York City. Brochure. Deals with a line of leather packings for use with hydraulic machinery, such as jacks, presses, accumulators, valves, etc. Among the special features claimed for this line, which is known as the Kromax packings, are ability to withstand oil and water pressure and heat, a reduced friction loss, and long life. Illustrations of the packings, which are made in the U, cup and flange styles, are presented, together with tables giving the various sizes that can be furnished. A number of useful hints on the application and use of the packings are included, together with the diagram showing the dimensions that should be given in ordering.

Portable Electric Drills.—Independent Pneumatic Tool Company, Thor Building, Chicago, Ill. Circular E-2. Relates to a line of portable electric drills which are said to be the only ones equipped throughout with ball and roller bearings. Views of the different tools are presented, together with a condensed table of specifications, and mention is made of the several types of speed changing gears that can be supplied to order.

Belt Hooks.—Sawyer Belt Hook Company, Pawtucket, R. I. Price list No. 7. Shows a number of different styles of hooks for leather, rubber and cotton belts. In connection with the illustrations of the various styles, information is given as to the width of belts for which they can be used and the way in which they are supplied. Mention is also made of a line of wedges for use in fastening axe and hammer heads in place.

Automatic Motor Starters.—Cutler-Hammer Mfg. Company, Milwaukee, Wis. Folder. Relates to the automatic control of motors and shows a number of starters of the automatic type employed in connection with house and sump pumps, vacuum cleaners, blowers, compressors and several kinds of machine tools. The use of push buttons and snap switches for the remote control of motors is touched upon, and a connection diagram showing the way in which a motor can be controlled from several locations or different floors by snap switches is included.

Rivets.—Champion Rivet Company, Cleveland, Ohio. Catalogue. Size, 6 x 9 in.; pages, 136. Contains a number of scientific facts and other valuable information about boiler, structural and ship rivets. This includes reports on physical and chemical tests made on the rivets, standard specifications for boiler rivets and the steel from which they are made, illustrations and dimension tables of the standard rivet heads, and tables of the weights of various sizes and shapes of rivets. Instructions on how to heat and drive rivets are given, and there are 37 pages of illustrations of work upon which the company's rivets have been used.

Portable Electric Tools.—Neil Smith Electric Tool Company, Cincinnati, Ohio. Catalogue No. 4. Devoted to the description of portable and fixed electric grinding and drilling machines. The catalogue, which contains 56 pages, also illustrates different classes of work for which the tools are adapted. Numerous tables of grinding wheel speeds are also included.

Speed Reduction Gears.—D. O. James Mfg. Company, 1120 West Monroe street, Chicago, Ill. Bulletin No. 5.

Treats of a line of speed reducing gears that are built with ratios of 4 to 1 up to 1600 to 1, and capacities of from 1 to 100 hp. A brief description of the construction and use of the gears is presented, together with views of installations and a number of tables of the different combinations that can be supplied. A dimension sheet is included and mention is also made of various sizes of cut tooth worms and worm gears that can be furnished.

Worms and Worm Gears.—Timken-David Brown Company, Detroit, Mich. Pamphlet. Is an illustrated story that outlines some of the important factors in the manufacture of Timken-David Brown worm gearing. The story describes completely how these worms and worm gears are made, and the text is supplemented by illustrations of a number of steps in the process. Illustrations of some of the gearing and the way in which it is used are also included.

Drop Forgings.—Strieby & Foote Company, 301 Ogden street, Newark, N. J. Lists the various sizes and styles of forgings that can be supplied for automobiles. These include spring clips, levers of various types, yoke and rod ends, radius and connecting rods, valve stems, steering knuckles and arms, gear blanks, hangers, etc. There is practically no text in the catalogue, which consists almost entirely of illustrations of the various forgings, supplemented by tables of the different sizes that can be supplied, or the principal dimensions where only one size is made.

Internal Combustion Engine.—Western Gas Engine Corporation, 900 North Main street, Los Angeles, Cal. Catalogue No. 15. Relates to a line of internal combustion engines using gasoline, distillate, naphtha, kerosene, gas oil, and coal, natural, oil, or producer gas as fuel. The special feature of the engine is a new type of governor which is located on the flywheel hub and operates through gears. Illustrations of the different styles of engine built and its various parts are included to supplement the text description. One of the features of the engine upon which special emphasis is laid is the use of vertical valves. Tables of dimensions and other useful information are included. An illustrated description of this engine appeared in *The Iron Age*, May 8, 1913.

Ball Bearings.—Hess-Bright Mfg. Company, Philadelphia, Pa. Set of loose leaf circulars. Relates to the use of ball bearings in connection with the transmission of power and machine tool construction. The set of sheets covers the use of ball bearings for shafts without shoulders, on electric motors, a turbine pump and lathe head and tailstocks. Illustrations of the various mountings are presented together with brief descriptions.

Ball Bearing Jacks.—A. O. Norton, Inc., 286 Congress street, Boston, Mass. Catalogue No. 28. Cancels all previous catalogues and lists a line of ball bearing jacks of various types. These include self-lowering, high speed jacks for car, bridge and general use, ball bearing cars, journal and general purpose jacks with cone bearings and track and automatic lowering jacks. All of the different types are illustrated with brief descriptions and condensed specification tables.

Steels, Wire and Forgings.—Carpenter Steel Company, Reading, Pa. General catalogue D. Relates to an extensive line of hot-rolled, hammered, cold-rolled and cold-drawn steels and wire, as well as rough and finished machined and heat treated forgings. After a general introduction, dealing with the manufacture of iron and steel, its grades and instructions for forging, hardening, tempering and annealing the different brands of tool steel are briefly described, with particular reference to the uses for which they are adapted. Reproductions of the labels of the several brands are given together with heat treating instructions. Lists of the various sizes of special steels that can be supplied are given, and a number of tables of useful information complete the catalogue.

Cycloidal Pumps.—Connersville Blower Company, Connersville, Ind. Catalogue No. 16. Calls attention to a line of two-impeller cycloidal rotary pumps that are built in a number of different styles for a great variety of uses. Among the work for which these pumps are suited is pumping water for filtration reservoirs, cooling towers, barometric condensers, circulating work, irrigation, etc., for handling oils, tar, liquid lard, ammonia, cyanide solutions, etc., for creating vacuums for condensers, for vacuum cleaning and heating systems, suction roll work, flat suction boxes, evaporation pans, etc. One particular advantage of this type of pump is that air or gases and water can be handled simultaneously. The construction of the pump is gone into at some length, with halftone and line drawings to supplement the text, and there are a number of views of the pumps in use. A table of capacities and the friction head for various sizes of pipe and flow velocities is included.

Presses and Special Machinery.—E. W. Bliss Company, 11 Adams street, Brooklyn, N. Y. Catalogue. Size, 6 x 9 in.; pages, 840. This is the fourteenth edition of the company's general catalogue and illustrates a few of the many machines regularly built. Those shown include presses; punching, shearing, slitting, trimming and double seaming machines; spinning lathes and special machines for working sheet metal, drop forging equipment and automatic machinery for the manufacture of tin cans. The book is divided into 21 sections, the first of which is devoted to general information, clutches and slide connections. The next 19 sections are given over to illustrations and brief descriptions of the various classes of machinery, and the final one contains a complete index and telegraph code.

Customs Decisions

CAST-IRON ARTICLES

The United States Court of Customs Appeals has sustained the Government's contention for a material restriction of the class of cast-iron articles that are to be accorded the lower duty-rate carried in the tariff law for "castings," as against "articles or wares not specially provided for, composed wholly or in chief value of metal." The case before the court was an appeal by the Department of Justice from a decision of the Board of General Appraisers sustaining a protest by the Durbrow & Hearne Mfg. Company, importer of eccentrics from Germany for the Star sewing machine. These were classified by the collector at New York as manufactures of metal not specially provided for under the tariff act of 1909, dutiable at 45 per cent. The importer claimed the goods to be finished castings of iron, dutiable at 1c. per lb. under paragraph 147. This contention was upheld by the board on review. The case then went to the customs court. At the hearing it was established that the eccentrics are made of cast iron, drilled, reamed and nickel-plated.

Judge Smith, who writes the decision for the court reversing the board, says the court holds the belief that Congress especially confined the operation of the paragraph under consideration to manufactures wholly of cast iron, and from that it follows that goods made up of cast iron and some other metal are not dutiable as castings of iron advanced in condition. The goods were undoubtedly originally wholly of cast iron, but subsequent to the casting they were plated with nickel, and must, therefore, be considered as manufactures composed of cast iron and nickel. "Consequently they are not covered by paragraph 147 and are strictly within the terms of paragraph 199, which lays a duty of 45 per cent. on articles or wares partly or wholly manufactured, not specially provided for and composed wholly or in part of metal."

Having won its contention for the higher duty, the Treasury Department is now expected to issue an order to customs officials throughout the country to return cast-iron articles, if in combination with other metals, under paragraph 167 of the tariff act of 1913, which calls for a duty 20 per cent. on manufactures of metal not specially provided for. Had the importer won the test case, goods similar and allied to those in controversy would have entered at 10 per cent. under paragraph 125 of the new law.

A MACHINE-TOOL CLASSIFICATION

Another decision made by the board, dealing with the question of what constitutes a machine tool, stands in the names of Goff & Page and the Whiting & Davis Company, Providence, R. I. The importations concerned rope-chain, link-forming, snap-forming, chain-making, bead-chain and curb machines. Duty was taken at the rate of 45 per cent. under paragraph 199, tariff act of 1909, as metal manufactures, the importers' claim being for a customs tax of 30 per cent. under paragraph 197 as machine tools. The testimony of several expert witnesses established that each of the machines in controversy is operated by electric power and is capable of cutting metal with the aid of a cutting tool. As the Government had no evidence in rebuttal, the board sustained the claims. Similar action was taken by the board in protests by Snow's Express Company, Ltd., and Alfred H. Post & Co., New York, relating respectively to bottle cap-making machines and machines working on brass wire for bending and cutting the material into the form of rings for use in making chains.

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